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PENNSYLVANIA AGRICULTURE AND COUNTRY LIFE

1840-1940

By

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Pennsylvania Agriculture
and Country Life

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Foreword

THOSE FAMILIAR with the first volume of Dean Fletcher's projected history of Pennsylvania agriculture and rural life from the earliest colonial times down to the near present have been looking forward to this second and concluding volume covering the past century.

As with the first volume, Dean Fletcher really has written two books. One is the evolution of farming as an industry and an occupation of Pennsylvanians. The other is concerned with the life of the farmer in terms of the individual and of the farm family. The first volume covered those years (1640-1840) in which agriculture was the dominant industry in Pennsylvania, a majority of the population was made up of farmers, and farm life and practices had not changed too greatly in two hundred years.

The first volume stopped in 1840 before farm machinery had come into use in any degree. The rise of manufacturing and the development of mining had not yet reached proportions where they dominated Pennsylvania economic affairs, nor had they brought about the rise of extensive urban living. All of these things, however, were in the beginning stages in 1840.

Dean Fletcher's second volume is important because it is the first effort on any extended scale to survey the changes which modern times have wrought in our State's farming and farm life. Here we do have the story of how farm machinery came into use, and its influence on farm practices and production. We have the story of science really applied fully to farming and its benefits brought right to the farm by the Agricultural Extension Services. We see farming taught as a way of life in the public schools and in the College of Agriculture at The Pennsylvania State University. We get something of the impact of all this producing revolutionary changes in farm methods and practices. The decline of the great wheat growing era and the emerging of new kinds of farming are given attention. In short, here we have a picture of how the machine age affected Pennsylvania agriculture and how agriculture has adjusted itself to a new way of life in which more people live in urban areas than live on farms.

And what is equally important, this book paints a picture of how modern conditions have affected the farmer and his family and how farm life has changed in the last hundred years. The end of subsistence farmsteads, rural isolation from advantages of larger community and town association, and the generally narrow horizon of the life of the early farmer are all pictured by Dean Fletcher with a keen appreciation for what farm life means to us today. Changes in the rural church, the passing of one-room rural schools, the end of the days when weddings and funerals were the highlights in a farmer's social diversion—all these and other changes and improvements in farm life are given full attention.

Persons interested solely in the very practical facts about the history of agriculture will find also a wealth of detail which makes the book an important reference work. The story of the State Board of Agriculture and what it did, the creation and functioning of the State Department of Agriculture, reference to many specific laws dealing with agriculture, in terms of when they were enacted and what they provided, the history of Agricultural Extension, The Agricultural Experiment Station and The Pennsylvania State University services for agriculture—all these, and other very specific things about the history of Pennsylvania agriculture are found within these pages.

We owe a great debt to Dean Fletcher for having written these two volumes. They are a crowning glory to an outstanding career of service in Pennsylvania agriculture.

The Pennsylvania Historical and Museum Commission is to be congratulated for its foresight in having these volumes published by the Commonwealth.

William L. Henning,
Secretary of Agriculture.

Preface

This is a companion volume to *Pennsylvania Agriculture and Country Life,* 1640-1840, by the same author, published by the Pennsylvania Historical and Museum Commission in 1950. It is an account of the technological, economic, and social advance in Pennsylvania agriculture since it ceased to be predominantly self-sufficing, about 1840, and became predominantly commercial.

Many individuals have contributed to the preparation of this book. The author is under special obligation to colleagues on the faculty of The Pennsylvania State University, to members of the staff of the Pennsylvania Department of Agriculture, and to others, especially John B. R. Dickey, who have reviewed the manuscript of certain chapters. Miss Anna Malone, Agriculture Librarian of the Pennsylvania State College, has facilitated access to source material.

William A. Hunter, Senior Archivist in the Public Records Division, Pennsylvania Historical and Museum Commission, is to be thanked for his editorial work in preparing this volume for the printer.

Parts of several chapters have appeared from time to time in *Pennsylvania Farmer.* Much of the material on fruit growing was first published in the Proceedings of the State Horticultural Association of Pennsylvania.

S. W. FLETCHER

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PENNSYLVANIA AGRICULTURE AND COUNTRY LIFE • 1840-1940

I

A prosperous Pennsylvania farmstead, 1940

THE LAND

DURING the period from 1840 to 1940, Pennsylvania agriculture was transformed gradually from a simple and largely self-sufficing occupation and way of life into a capitalistic, scientific, and highly commercial enterprise. Prior to 1840, crops and livestock on a majority of farms were produced primarily to feed the farmers and their families, with possibly some surplus to sell. They were mainly the fruits of human labor. Except salt, spices, and sugar, the farmer's table was supplied with the products of his own farm, his family was clothed with linen from his own flax or wool from his own sheep, and shod with shoes made from the hides of his own cattle. It was a quiet, pastoral existence, far removed from the hustle and bustle of modern commercial farming.

With the advent of railroads and the development of town and city markets, beginning about 1840 and greatly accelerated after the Civil War, Pennsylvania farmers began to produce crops and livestock primarily to sell, and to buy much of their food and practically all their clothing. They have been the beneficiaries of remarkable developments in agricultural technique resulting from the contributions of science and technology. Their farms have become highly mechanized; power machinery now performs much of the work that formerly required arduous manual labor. They are no longer mere tillers of the soil; they are business men.

This trend has gathered momentum with the years and has been accompanied by ever-increasing specialization, particularly in the production of milk, meat, poultry, potatoes, tobacco, vegetables, and fruit. Nevertheless, a majority of Pennsylvania farmers still are engaged in general farming with emphasis on dairying. The "rugged individualism" of nineteenth-century farmers has largely given way to group action and to steadily increasing reliance on government. Changes in Pennsylvania agriculture and rural life during the past century are so momentous as to constitute an agricultural revolution.

AREA IN FARMS

In no other aspect of agriculture has the change in both point of view and practice been greater than in the use of land. There is now more general recognition of the fact that land is the veritable mother of the human race; that from it mankind draws all the primal necessities of life—food, shelter and clothing; that it is, in truth, "Mother Earth."

By 1840 the agricultural frontier in Pennsylvania had disappeared. The last stronghold of the primeval forest, comprising the present counties of Cameron, Elk, and Forest, had a scant population, at first lumbermen, then farmers. With the advance of settlement, the area in farms increased from about 14,000,000 acres in 1840 to slightly over 19,000,000 acres in 1900.[1] After that there was a sharp decline; by 1940 the total area in farms was again about 14,000,000 acres, as it had been a century earlier.

The primary cause of this shrinkage was the abandonment of rough or infertile land, some of which was fairly satisfactory in subsistence farming. A much smaller area was used for purposes other than agriculture, mainly in urban and industrial development. Between 1900 and 1940 a considerable proportion of the farm land of Philadelphia, Delaware, Chester, Montgomery, and Allegheny counties was converted to suburban and industrial use to meet the needs of the great and growing cities of Philadelphia and Pittsburgh. By 1940 approximately fifty per cent of the total land area of Pennsylvania, 28,692,480 acres, was in farms, as compared with about sixty per cent in 1840. It is significant, however, that in spite of this considerable decrease in farm acreage, agricultural production not only has been maintained at the 1840 level but has been greatly increased as a result of improved farm technique.

Until about 1900, the area of cultivated land expanded at the expense of forest land. Since then the process has been reversed. The shrinkage has been mainly in areas where agriculture, even at best, is a marginal enterprise. It has occurred to some extent in all parts of the State but has been heaviest in the northern, central, and western counties, where the terrain, in general, is more rugged than in the southeastern counties. Between 1900 and 1940, more than fifty per cent of the farm land in Cameron, Carbon, Monroe, and Pike counties reverted to forest. Under present economic conditions it is advantageous to convert poor farming land into good forest land.

The percentage of land in farms in the several counties varies from eighty-five to ninety-five per cent in Bucks, Chester, Erie, Greene, Lancaster, Montour, Washington, and York counties to eight to twenty per cent in Cameron, Elk, Forest, and McKean counties. In 1940 Lancaster County had the highest percentage of land in crops harvested (sixty-three per cent) and Cameron the lowest (two per cent).

Part of the land now in forest or reverting to forest constitutes a reserve which may be drawn upon by future generations. While most of the present non-agricultural land, especially in mountainous districts, is permanently unsuitable for agriculture, a small proportion may find use under economic conditions that may prevail centuries hence. In countries where practically all the tillable acres are under the plow, as in some parts of Europe and Asia, there is little opportunity for expansion and the people feel cramped. This is not true in the United States and particularly in Pennsylvania, which has the added advantage of not being limited in rainfall for crop production, as are the arid districts of the West.

In some parts of the State, however, land hunger already is in evidence, particularly in the Amish and Dunkard communities of Lancaster County. Since practically all Amish and Dunkers are farmers who desire to live together in closely-knit religious-economic communities, there is constant need for more land on which to establish their children. Until about 1840 this need could be met by buying the farms of non-Plain People within or adjacent to the communities. By 1940 this opportunity for expansion had largely disappeared; some young Amishmen had to defer marriage because they could not readily find farms on which to establish their families. This pressure has been responsible for the very high land values in Amish communities—up to $500 an acre in some cases—fully as much as has the actual productive value of the land. The recent migrations of a number of Amish families from Lancaster County were due primarily to scarcity of suitable land.

According to the classification of the United States Census, a farm consists of three acres or more; if less, it still may be considered as a farm provided at least $250 worth of agricultural products are raised annually. On this basis, the number of farms in Pennsylvania nearly doubled between 1840 and 1900—from 127,577 to 224,248. After 1900 the number declined rapidly; by 1940 there were 169,027. The increase prior to 1900 was due to the advance of settlement, the aftermath of lumbering and expanding markets. The decrease thereafter was due to the lure of cheap virgin land in the West, the combination of two or more small farms to make a unit of more economic size in the use of labor-saving machinery, the conversion of farms near cities and towns for urban and industrial uses, and the abandonment of sub-marginal land. Census statistics on number of farms are likely to be misleading. In 1930 about 2,000 fewer farms were reported in Lancaster County than in 1920, but practically all of them were absorbed by neighboring farms and so passed out of enumeration by the census. Eighty per cent of them are under fifty acress and many were under twenty-five.[2]

In 1940 Lancaster County had the largest number of farms (8,446), followed by York (7,120); while Cameron (165) and Forest (276) had the smallest number.

The economic and social changes represented by census statistics often are significant. During the depression years 1930 to 1935 there was an increase of twelve per cent in the number of Pennsylvania farms.[3] These, however, were mostly of the poorer type that had been abandoned during the prosperous twenties but on which there were houses capable of sheltering desperate families fleeing from cities in which no employment could be found. Most of them were again abandoned about 1938, when more favorable economic conditions prevailed. Some were tracts of only three to five acres, just large enough to be listed as farms, and were operated almost wholly on a subsistence basis.

ABANDONED FARMS

Even before 1840 there were some abandoned farms. Public attention did not begin to focus upon this problem, however, until after 1900. Most of them were abandoned because they were more suitable for the production of forest trees than of farm crops and never should have been cleared. For a few years the new ground may have produced fairly well in subsistence farming, but it could not meet the competition of more fertile land in commercial farming. Some were abandoned because the land was taken over or ruined by mining or other industrial operations.

Abandonment of sub-marginal farms is a slow process; it has been going on for more than a century and still is far from complete. Many such farms do not remain permanently abandoned; other farmers come along and hopefully seek to wring a precarious livelihood from land that their predecessors had given up in despair. Some abandoned farms on soils that once were productive can be brought back to profitable agriculture but those on naturally poor soils usually are hopeless.

Sub-marginal farms are abandoned in largest numbers during "good times," when employment in industry is readily available. A survey made by the Pennsylvania Department of Agriculture in June, 1920, revealed that an estimated 6,469 of the 214,000 farms in the State were at that time idle and untenanted.[4] They were most numerous in Armstrong, Butler, Indiana, Jefferson, Susquehanna, and Tioga counties, each of which had 130 or more. A similar survey made in June, 1926, indicated that there were "between 12,000 and 13,000 farm houses, which were either vacant or occupied by persons not engaged in agriculture. This figure is double the estimated number in June, 1920."[5] This situation prevailed in spite of the current depression.

A detailed survey of the farms of Blair County, most of which is hilly and mountainous, revealed that "nearly one-fourth of the 204,169 acres of the land in Blair County farms in 1900 was no longer in farms in 1940. Most of this decrease of land in farms was the result of abandonment of farm land no longer suited to agricultural use."[6] Many of these abandoned farm homes again sheltered families during the depression period of 1928-1938 and part of the land, at least, was tilled to help feed the urban outcasts that re-occupied them.

The abandonment of many farms between 1840 and 1890 was due to the lure of free or cheap virgin land in the West. From 1840 to 1860, especially, Pennsylvania farmers, mostly those on the poorer soils, emigrated in large numbers. The political platform of those on the westward march was "Free soil, free speech, free labor and free men." The reassuring word was passed along, "Uncle Sam has land enough for us all." A popular campaign slogan was "Vote yourself a farm."

The westward trek was accelerated by the Homestead Law enacted by Congress in 1862. Under it any American citizen of twenty-one or over could file claim to 160 acres (later, 320 acres in the semi-arid sections) of unappropriated public land. After having "resided upon or cultivated the same for a term of five years immediately succeeding the time of filing" and upon the payment of a small commission, he was granted a patent.[7] Many soldiers returning from the Civil War and restless for adventure left the old homestead to seek their fortunes in the West. In addition, the transcontinental railroads were granted, free, over 183,000,000 acres of public land by the federal and state governments; this they sold for two to four dollars an acre. A considerable body of land previously assigned to Indian tribes also was opened to settlement during this period.

Not until about 1890, when the available supply of good agricultural land in the public domain had become exhausted, did the emigration of Pennsylvania farmers begin to slacken. The passing of the frontier of free or cheap land marked the end of an epoch in our national history. Thereafter there was no escape to virgin land beyond the Pennsylvania hills. Farmers then began to be more concerned about improving the land they had.

SIZE OF FARMS

Pennsylvania is a state of small "family-size" farms, operated for the most part by the owners and their families; there are very few large "factory farms." The average size decreased from 117 acres in 1850 to eighty-four acres in 1900, after which there was a slight increase; in 1940 the average was eighty-six acres. The decrease prior to 1900 was due to higher land values, more intensive culture, subdivision among children, and greater competition for good land. The increase since 1900 was due mainly to the necessity of having sufficient acreage to justify investment in power machinery. The majority of farms are from fifty to one hundred acres.

Size of farms varies with the locality, the type of farming, and the managerial capacity of the farmer. Excepting counties immediately adjacent to Philadelphia and Pittsburgh, parts of which are semiurban, the range in 1940 was from an average of sixty acres in Lancaster County to one hundred and forty acres in Potter County. The agriculture of the Lancaster limestone plain, with its small farms, high land values, and intensive culture, more closely resembles that of western Europe than that of any other part of the United States does, but the great bank barns are distinctive. A much larger proportion of the farms in northern and central counties is in woodlot than in the southeastern counties. The average number of acress of "improved land—in cultivated crops—per farm declined from sixty-four acres in 1860 to forty-eight acres in 1940.

Economic forces are operating both to increase and to decrease the size of farms. In the less intensive districts the trend is toward farm consolidation in order to permit the use of power machinery. Writing of conditions in Wyoming County in 1930, P. I. Wrigley says: "Farm consolidation now is taking place, but the process is so slow that it is almost unnoticed. There are instances in almost every township of two or more farms being joined in recent years to make one farm, but there are almost no instances of single farms being divided to make two. With this consolidation there will be a tendency to abandon for agricultural purposes the poorer, rougher, and more inaccessable parts of the farms."[8]

On the other hand, in those sections where land values are high and farming intensive the trend until recent years was toward smaller farms. This is illustrated in Lancaster and York counties. With few exceptions, Pennsylvania German farmers in those counties, particularly Mennonites and Amish, have lived on small farms operated by the farmers themselves with the aid of their families. The "Garden Spot" type of agriculture that distinguishes these counties developed soon after the Revolution, at which time the average farm unit was one hundred acres. By 1940 it was sixty acres.

In 1906 the United States Department of Agriculture published a bulletin, "An Example of Model Farming." This was a description of the fifteen-acre farm of Rev. J. D. Detrich of Flourtown, York County, which raised "all the roughage for 30 head of stock, 17 of which are cows in milk."[9] Some Amish families of Lancaster County make a comfortable living on ten acres very intensively cultivated in tobacco or truck crops. These small farms are reminiscent of a book which appeared in 1864, *Ten Acres Enough*, by William Streeter. This purported to show "how a very small farm may be made to keep a very large family." It was read avidly by urban would-be back-to-the-landers and lured far more of them to ignominious failure in the country than it helped to establish securely on the land.

Although some farmers have built economic security from a small acreage, especially in the culture of tobacco, vegetables, and flowers, and the production of poultry, the majority have found that the law of diminishing returns operates against a very small farm. In 1918 the United States Department of Agriculture made a study of Chester County farms which revealed that, other things being equal, small farms were less profitable than large farms, primarily because of the greater expense for equipment and operation per unit of production. The criterion is the ratio of return to a man rather than the return to an acre.

Very large farms, whether personally owned or corporation owned, never have been an important factor in Pennsylvania agriculture. Even in 1850 there were only 114 farms of over 1000 acres each, and they were mostly woodland. About 1925 there was much interest in the possibilities of corporation or industrialized "factory farms," and a few enthusiasts predicted that the small, family-size farm soon would become extinct. They were poor prophets. There have been a few successful corporate farms of large size, especially in fruit and vegetable production, but for the most part they have not met expectations, primarily because the loss from high overhead and lack of the incentive inspired by personal ownership more than offset the gain from large-scale production and merchandising.

Instances are more numerous of individual farmers of large administrative capacity who have operated several thousand acres successfully, usually as a number of separate farms. About 1910 Clark Grazier of Blair County owned 6,000 acres, of which 3,000 were cropped. Alexander Billmeyer of Montour County operated 2,000 acres in fifteen farms. In 1904 the "Estate of James McCormick" of Cumberland County owned thirty-five farms averaging about one hundred acres. Each farm was operated as a financial unit under a liberal lease agreement with the occupier but under the general direction of the estate farm manager. On the whole, however, large-scale farming has made little headway in Pennsylvania.

In spite of shifts made desirable by the advent of power machinery, it is likely that small, privately-owned farms will continue to dominate Pennsylvania agriculture and that the farmer of the future will, as Abraham Lincoln predicted in 1859, be able to practice "the art of deriving a comfortable subsistence from the smallest area of soil."[10] This is as it should be; a large number of small freeholders on the land is one of the most potent means of perpetuating the democratic way of life.

TYPES OF FARMING

The strength of Pennsylvania agriculture lies not only in well-tilled, owner-operated farms but also in diversified farming. While dairying is the major source of income on a majority of the units, general farms, in which the income from no one source—as from dairying, grain, or livestock—amounts to forty per cent or more of the total value of all products, are most numerous. Approximately one-third of all farms were of this type in 1930.[11]

Next most numerous are dairy farms, those on which forty per cent or more of the income is derived from the dairy cow. Approximately one-fourth of the farms were of this type in 1930. They were found in every county, but the largest concentration was in Bradford County (fifty-five per cent), Crawford County (fifty-one per cent) and Chester County (forty-six per cent). General farms and dairy farms comprised more than half of all farms in that census year.

About ten per cent of the farms, in 1930, were devoted to crop specialties, chiefly potatoes, tobacco, fruit, and vegetables; and six per cent to animal specialties, mainly poultry, sheep, and beef cattle. Grain was the major source of income on less than two per cent of Pennsylvania farms in 1930; this was in striking contrast to the situation in 1840, when grain was by far the most important source of farm income throughout the State.

The remaining third of the farms were part-time and self-sufficing units of little significance commercially. By census classification a part-time farm is one where the owner spends 150 or more days a year off the farm engaged in other than farm work, provided the value of the farm products does not exceed $750 a year. With its extensive, diversified, and widely scattered industries, Pennsylvania offers unusual opportunities for part-time farming. It is found near industrial centers all over the State, but is most common in the coal, iron, oil, and forest areas. The average size of part-time farms in 1930 was forty acres.

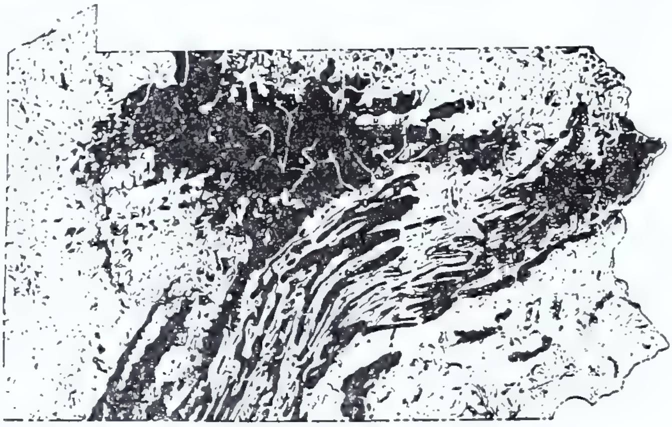
There still is a large number of self-sufficing farms. As defined by the census, these are farms from which fifty per cent or more of the products is used directly by the family. They are most common on rough and poor land, especially in the coal regions and in areas remote from markets. In 1930 the range of their occurrence was from three per cent of the farms of Lancaster County to twenty-five per cent of the farms of Clearfield County.

It seems likely that the trend toward specialized farming, which began about 1840 and was greatly accelerated after 1900, will continue, and that there will be a larger number of part-time farms as the industrial life of the Commonwealth continues to expand.

LAND CLASSIFICATION

Guided mainly by census statistics on the relative income from farms in townships of different soil types, economists have divided the land area of the State into six classes according to relative productiveness:[12]

Woodland. About forty per cent of the State is in forest or brush.



The forest areas of Pennsylvania

Very Poor (sub-marginal) Land. Approximately three per cent of the total land area or four per cent of the farm area is of this type. It is practically worthless for agriculture under present economic conditions.

Poor Land. This comprises nineteen per cent of the total land area or twenty-seven per cent of the farm area. Most of it is rough or steep. Farms on poor land are profitable over a term of years only under exceptional circumstances and the most skillful management.

Average Farm Land. About nineteen per cent of the total land area or thirty per cent of the farm area is of this character. Under good management it is reasonably productive.

Good Farm Land. This comprises about eleven per cent of the total land area or eighteen per cent of the farm area.

Best Farm Land. About four per cent of the total land area or seven per cent of the farm area is of the highest quality.

Although only about twenty-five per cent of the farm land is classified as "good" or "best," more than fifty per cent of the crops and livestock produced come from farms located on these two superior types.

The first sustained attempt to map and classify Pennsylvania soils according to their relative value for agriculture and other purposes was the Soil Survey, which was begun in 1901 by the United States Department of Agriculture in cooperation with The Pennsylvania State College. By 1936 twenty-four counties had been completed. In recent years the surveys have been made in greater detail and have indicated native ground cover as well as soils, so that they are more useful both to farmers and to public agencies responsible for the formulation of plans for land conservation. In 1937 and 1938 the United States Department of Agriculture made detailed aerial photographs of all the farm lands of the State. These showed contours, woodlands, field arrangement, and other important aspects of every farm. They were used in the operation of the agricultural conservation and soil conservation programs of the federal government.

A beginning has been made in the classification of land by counties. The purposes of land classification are to indicate to prospective purchasers the probable relative earning capacity of different types of land; to indicate to lending agencies the probable relative amounts of credit that might be extended safely to farmers on different soil types; to aid in determining the justification of extending or improving roads, schools, electric power lines, and other facilities; to assist assessors in making fair assessments; and to aid federal and state government in the purchase, for use in forestry or public recreation, of land that is unsuitable for agriculture. Blair was the first county in which this fundamental appraisal of land resources was made.[13]

THE CONSERVATION MOVEMENT

The first public recognition of the need for conserving the primary natural resources of the nation—soil, forests, water, minerals, wild life—was in 1907, when President Theodore Roosevelt appointed the Inland Waterways Commission. Gifford Pinchot of Pennsylvania, then Chief of the United States Forest Service, was a member of this Commission. Largely through his initiative, President Roosevelt called in May, 1908, a "Conference of Governors" of all the states "to consider the question of the conservation and use of the fundamental sources of wealth." In opening the Conference President Roosevelt said, "We began with an unapproached heritage of forests; more than half the timber is gone. . . . We began with soils of unexampled fertility and we have so impoverished them by injudicious use and by failing to check erosion that their crop-producing power is diminishing instead of increasing. . . . When [the American settler] exhausted the soil of his farm he felt that his son could go West and take up another. . . . Now all this is changed. On the average the son of the farmer of to-day must make his living on his father's farm. . . . No wise use of a farm exhausts its fertility."[14]

The Conference of Governors declared, "The prosperity of our country rests upon the conservation of the land chosen by our forefathers for their homes," and urged that this problem "engage the unremitting attention of the Nation and the states." Acting on a recommendation of the Conference, President Roosevelt appointed, in June, 1908, a Commission on the Conservation of Natural Resources to cooperate with similar commissions that might be organized in the states.

Soon thereafter the conservation movement began to enlist public support in Pennsylvania. Strangely enough, however, it was concerned almost wholly with products of the land, forests and wildlife, not with the land itself. Practically no consideration was given to soil erosion, which had been a serious problem for many years although less obvious than denuded, fire-devastated forest land. Beginning in 1917, the State Grange had a standing committee on Conservation of which Gifford Pinchot was Chairman. The annual reports of this committee dealt almost exclusively with reforestation, wildlife, and stream pollution; as late as 1936 they made no mention of soil conservation.

The Pennsylvania State Conservation Council was organized in 1922. It included representatives from the Pennsylvania Forestry Association, Wild Life League, Izaak Walton League, sportsmen's associations, Audubon societies, wild flower societies, State Chamber of Commerce, State Grange, State Department of Forests and Waters, State Department of Agriculture, State Fish and Game Commissions, and The Pennsylvania State College. The Council was concerned chiefly with reforestation, especially the purchase by the State of cut-over land for public use. In 1924 it promoted a $25,000,000 bond issue for forest land purchase and improvement. Soil conservation was practically ignored. The Council ceased to function in 1932.

FOREST CONSERVATION

Forest conservation has an important relation to agriculture not only because about half of the great forest area of the State is in farm woodlots but also because large tracts of sub-marginal farm land are reverting to forest and because of forest influence on stream flow and water conservation.

There is no more shocking example of human greed and utter disregard of the public welfare than the ruthless devastation of the forests of Pennsylvania by lumber companies between 1840 and 1900. No consideration whatever was given to forest regeneration; clear cutting, not selective cutting, was practiced universally. If any seed trees were left it was by accident, not intent.

Some lumber companies controlled many square miles of forest and employed hundreds of lumberjacks. Throughout the mountainous sections of northern and central Pennsylvania lumber towns sprang up as if by magic. In their heyday some had a population of several hundreds. Most of them, like the bonanza mining towns of the West, now are ghost towns. Only in the memories of a few "old timers" does this colorful but discreditable chapter of Pennsylvania history live. Forest fires followed in the wake of the lumbermen, licking up the brush, killing the saplings, and destroying the soil cover of organic material that had accumulated through the centuries. By 1890 most of the vast forest area of the State was a scene of almost incredible desolation.

The only remaining virgin forest of any considerable extent is Cook Forest of 8,000 acres in Clarion, Forest, and Jefferson counties; this was acquired by the State in 1927. Many of its giant trees of white pine, hemlock, and other species stretch upward 125 feet or more to the first limbs and are 300 to 400 years old. They were sizable trees when William Penn first set foot on his domain. Cook Forest is a glimpse of the unrivaled heritage that was frittered away during the last half of the nineteenth century.

This was the background of the forest conservation movement in Pennsylvania, beginning about 1885. Earlier attempts to enlist public support had been fruitless. Heeding Sir Walter Scott's story of the advice of the old Scotsman to his son, "Be aye stickin' in a tree, Jock; it will be growin' when ye're a sleepin," Arbor Day was established by the General Assembly in 1885. It accomplished little except the planting of trees on home and school grounds. Governor Hartranft was the first chief executive to call to the attention of the General Assembly the need for forest legislation, in 1873, but no action was taken. In 1885 the State Board of Agriculture, appalled at the reckless depletion of this natural resource, recommended to the Governor that he appoint a Commission on Forestry "to check the wanton destruction of our forests."[15] The warning fell on deaf ears.

The beginning of forest conservation was the organization of the Pennsylvania Forestry Association in 1886. Publication of its influential organ, *Forest Leaves,* began the same year. This Association has sponsored most of the legislative measures that have furthered the movement. Dr. Joseph T. Rothrock, who had served as Professor of Botany at the University of Pennsylvania since 1877, was the first Secretary and moving spirit of the Association. For more than a quarter century he was an untiring and inspiring evangelist for forest conservation. He met and overcame bitter opposition from forest owners who thought that the proposed program would conflict with their pecuniary interests and eventually lead to prohibition by the state of timber cutting by private citizens. Says Henry Clepper, "The growth of forestry in the Commonwealth was essentially an indigenous development, principal credit for which belongs to Dr. Rothrock, who gave more than half of his life to it." He was, in truth, the "Father of Pennsylvania Forestry."[16]

One of the first activities of the Association was to promote an inquiry into forest conditions by a special legislative commission appointed in 1887. This bore little fruit. In 1893, however, a similar commission of two members, one of whom was Dr. Rothrock, was appointed by Governor Pattison. The convincing report of this commission led to the creation of a Division of Forestry in the State Department of Agriculture by act of March 14, 1895. Dr. Rothrock was appointed the first Commissioner of Forestry. In 1901 this Division was given departmental status and in 1929 it was reorganized as the Department of Forests and Waters. Dr. Rothrock served as head until 1904 and continued as Secretary of the State Forestry Reservation Commission until 1913. Gifford Pinchot, who served as Commissioner of Forestry from 1920 to 1924, gave further impetus to the conservation program.

The most pressing need was to check forest fires, which hitherto had raged with little or no attempt at control. "So common have they become in many parts of our state," said Dr. William A. Buckhout in 1893, "that their appearance causes but little surprise, and they are looked upon almost as a matter of course, little if anything being done to prevent or to extinguish them. . . . Our mountain and other lands which should be in process of reforestation are periodically burned over . . . [Forest fires] are frequently due to criminal carelessness and indifference on the part of hunters, fishermen, berry pickers and the like. . . . Contemptuous of the potential value of wild lands, [they] think but lightly of starting a fire which may get beyond their control, or even of firing directly, if it suits them to do it."[17] At that time the State had two wholly unobserved forest fire laws, one of which (June 2, 1870) authorized county commissioners to appoint fire wardens; the other (June 11, 1879) provided that any person who "wantonly and willfully" started a fire in the woods was subject to a fine of $300 and to imprisonment.

The loss from forest fires was heavy. In the year 1895, according to the Commissioner of Forestry, "there were about 225,000 acres of woodland burned over, occasioning a great loss of valuable timber aggregating fully one million of dollars."[18] The Act of March 30, 1897, imposed more severe penalties for incendiary fires and provided that the State would share the expense of fire fighting with the counties. This effected some improvement, but not until after 1915 was the fire hazard materially reduced by the employment of more fire wardens, the erection of fire observation towers, and more stringent law enforcement. In that year more than 300,000 acres of forest land were burned over. The Commissioner of Forestry reported that railroads were responsible for 169 fires, campers for thirty-nine, and careless lumbering for thirty-seven, and that fifty-eight were incendiary. By 1927 the average size of forest fires had been reduced from 400 acres to less than fifty.

FOREST RESERVATIONS

Concurrent with the fire control program, large tracts of cut-over forest land were purchased from time to time by the State in order to protect watersheds, promote reforestation, conserve wildlife, and provide opportunity for recreation. The report of the Forestry Commission to the General Assembly in 1895 recommended that three forest reservations of about 40,000 acres each be established, to be secured by the purchase of land advertised to be sold for unpaid taxes. Commissioner Rothrock stated, "In 1894, the amount of land, seated and unseated, advertised to be sold for taxes in the different counties of the Commonwealth . . . was upward of 1,500,000 [acres]."[19] This recommendation was not acted upon until May 5, 1897, when three forest reservations of approximately 40,000 acres each were authorized, to be located on the watersheds of the Delaware, Susquehanna, and Ohio rivers. On June 13, 1898, Dr. Rothrock purchased the first tract under this program, 460 acres in Clinton County. The law stipulated that only the amount due in taxes and costs could be paid for the land.

Thereafter forest land purchases by the State proceeded rapidly. By 1909 the State had acquired 861,919 acres in twenty-four counties, mostly in the Susquehanna River basin, with smaller reserves in Monroe and Pike counties.[20] State forest land purchase and development were aided materially by a bond issue of $25,000,000 authorized for this purpose by the electorate in 1925. By 1945 the State forest reserves comprised 1,655,822 acres. In addition, the Allegheny National Forest, a federal reserve established in 1923 and comprising 461,343 acres; the State game lands and refuges comprising 755,489 acres; municipal and community forests comprising 67,414 acres; and other publicly-owned forest land comprising 72,236 acres, brought the total area of Pennsylvania in public forests to 3,015,304 acres.[21]

This investment now is paying high dividends in public recreation and water conservation; eventually the State forests probably will prove to be a sound investment for timber production, also. It takes thirty years or more for a forest tree to grow to usable size, hence reforestation is not an attractive investment to most individuals. Furthermore, to be effective it should be done on a large scale. This particular activity, therefore, seems to call for state, as well as private, enterprise. The average cost of State forest land up to 1922 was $2.48 an acre.

Prior to 1912 chestnut comprised from twenty to thirty per cent of the forests of southern and central Pennsylvania; this species was one of the mainstays of farmers for use as posts, rails, firewood, and to some extent as lumber. By 1920 chestnut had practically disappeared, a victim of chestnut blight, an Asiatic disease introduced into America in 1904. In 1911 the General Assembly authorized the appointment of a Chestnut Blight Commission, but nothing could stay the gradual advance of the disease. The passing of chestnut was a heavy blow to farmers as well as lumbermen. In 1919 a giant blight-killed chestnut in Bucks County was removed. It was eleven feet in diameter at the butt and was pronounced, by the United States Forestry Commission, the largest known tree of any kind in the United States save the redwoods of California.[22]

Efforts to encourage reforestation by private citizens have had scant success. The first act of General Assembly to encourage reforestation was that of May 2, 1879. This provided a rebate from the road tax for those who planted trees on their premises or along the highways abutting them. This law never was effective.

On June 1, 1887, the General Assembly passed an act which provided, "In consideration of the public benefit to be derived from the planting and cultivating of forest or timber trees" owners of land planted with such trees, not less than 1200 to the acre, were entitled to receive a tax rebate of not over forty-five cents an acre for the first ten years after planting, forty cents an acre for the second ten years, and twenty-five cents an acre for the third and fourth decades. This law, also, was a dead letter from its passage.

On April 11, 1901, the Legislature authorized counties to suspend eighty per cent of the taxes on land in growing timber, up to fifty acres a person, until the crop was harvested, provided the trees then were at least eight inches in diameter. The maximum rebate was forty-five cents an acre. No effort was made to put this law into effect.

In 1913 the General Assembly passed an "Auxiliary Forest Preserve Act" under which taxes on young timber land or reforested areas would be partially deferred, on not more than an assessed valuation of one dollar an acre, until the timber crop was harvested, when one-tenth of the stumpage value of the cut was to be collected. Meanwhile the State would compensate the school and road districts for the loss of revenue by paying into the local funds, for each purpose, at the rate of two cents an acre for all land brought under the operation of the law. This act was declared unconstitutional by the courts. The policy of suspending taxes on young forests, so long advocated by the Pennsylvania Forestry Association, remains an unsettled issue to this day.

Much more effective has been reforestation through the distribution at a nominal price of forest tree seedlings grown in nurseries operated by the State Department of Forests and Waters. In 1927 enough seedlings were distributed to reforest over 60,000 acres. They were planted on farm woodlots and on sub-marginal farm land as well as on State Forest land. Reforestation of the great area of cut-over land, both publicly and privately owned, continues to be mainly by natural reproduction.

The marked progress in forest conservation after 1900 was accompanied by an equally marked increase in wildlife, especially deer, the premier game animal of the State. By 1905 deer had been almost exterminated. Under rigid doe-protection laws passed in 1907 over the strenuous opposition of hunters, the deer population increased rapidly. In 1927 the State Board of Game Commissioners estimated that more than 3,000,000 deer roamed the rejuvenated forests of the Commonwealth, of which 700,000 were bucks, 1,300,000 does, and 1,000,000 fawns. Deer became so numerous in some districts that thousands died in winter for lack of food, browse not being as abundant as it was during the first few years after lumbering. Deer depredation on crops, especially young fruit trees, caused heavy loss to farmers. The State did not recompense this loss, even though protected game is the property of the State. Eventually some measure of relief was provided by the erection of deer-proof fences in critical locations and reduction in numbers locally by opening specified areas in certain seasons to the killing of doe.

By 1940 Pennsylvania was the outstanding deer-hunting state of the Union. In that year, which was open to the killing of doe throughout the State, over 8,000 tons of venison, according to the State Board of Game Commissioners, were taken from the forests. This great quantity of meat was derived from 40,995 bucks and 145,580 antlerless deer. Normally, however, the kill has been around 20,000 legal bucks a year.

Additional by-products of the forest and wildlife conservation program, of which farmers are the beneficiaries as well as city sportsmen, are the large numbers of other kinds of game taken each year. In 1936 the reported kill, other than deer, was 356 bear, 1,400,000 rabbits, 374,000 grey squirrels, 270,000 ring-neck pheasants, 3,200 wild turkeys, 97,000 ruffed grouse, and 100,000 shore and water fowl. In 1935 the State Board of Game Commissioners began to cooperate with farmers in a "Farm-Game Program." Adjacent farmers signed long-term agreements with the Commission, making available certain parts of their land for game-breeding purposes. The cooperating farmers had unusual hunting advantages and the Commission guaranteed them against damage by other sportsmen.

The forest and wildlife conservation programs of Pennsylvania, beginning about 1900, were admirably conceived and efficiently executed. By 1920 the State was in the forefront in these phases of conservation.

THE PHILOSOPHY OF SOIL CONSERVATION

The marked progress in forest conservation was in sharp contrast to the general apathy, prior to 1933, with respect to the much greater problem of soil conservation. In all parts of the State except on the comparatively small area of level or gently sloping land, gully and sheet erosion had been progressing at a constantly accelerated rate since colonial days. Here and there warning voices had been raised, and a few farmers had adopted soil conservation practices; but the majority were indifferent. The Agricultural Extension Service of The Pennsylvania State College had advocated and demonstrated these practices since it was established in 1914, but comparatively few farmers had been reached.

Warnings about the heavy loss from soil erosion had not been wanting. In 1896 a forester, Dr. Joseph T. Rothrock, called attention to the removal of fertile soil from farms by water.[23] In 1904 an eminent geologist, Nathaniel Shaler, sounded this grim warning: "If soil erosion cannot be prevented we must look forward to a time—remote it may be, yet closely discernible—when our kind, having wasted its inheritance, will fade from the earth." In 1909 N. B. Critchfield, State Secretary of Agriculture, wrote, "Another thing affecting the maintenance of fertility, which at the present time is quite common, is the washing away of the soil and its fertility by erosion. As the organic matter in the soil decreases, the erosion increases. . . . Moisture coming from the snows of the winter and the rains of the spring . . ., so much needed for crop production, enters our streams and flows away."[24]

About this time it became more generally recognized that the public has a stake in soil conservation far greater than that of the farm owner. This underlying philosophy was expressed by Dean Liberty Hyde Bailey of Cornell University in 1911, when he addressed Pennsylvania farmers in these challenging words: "No farmer in the last analysis, owns his land, not even in Lancaster county, Pennsylvania. A man does not take it with him into the next world. Society, that is, government, allows a man . . . to hold a piece of land, . . . that he may make a living from it, and that he may help the rest of us to live . . .

"Farming is a quasi-public business . . . The earth . . . belongs to all the people. The farmer is the agent of society, or the people, to use land for the good of us all, as well as for the good of himself. No man has a right to skin the surface of the earth . . . Every man who tills land owes a responsibility to society and to God for the use that he makes of it."[25] The Mennonite and Amish farmers of Pennsylvania have held this point of view for centuries.

The paramount interest of society in the conservation of the soil has been stated in a description of the "German Family Farm": "This concept of the farm as the hereditary home of the family has profound consequences. . . . The land is the foundation of the family, the heritage from the past to be handed on to the next generation undiminished in fertility, and, if possible, with its productivity increased. One could sense . . . the feeling that a man who lets his land erode away was not only dishonoring his ancestors but also depriving his son of the proper heritage."[26]

SOIL CONSERVATION PRACTICES

Although special soil-conserving practices were not adopted by Pennsylvania farmers generally until after 1933, in a few localities they had been in effect for many years. Pennsylvania pioneered in contour or strip farming, one of the most useful soil-conserving practices on sloping land. This consists of dividing the slope into narrow bands or strips, about eighty to one hundred feet wide and running across the slope approximately on the contour. The crops grown on these strips are rotated so that a cultivated crop, as corn, alternates with an uncultivated crop, as grass or winter grain.

The oldest strip farming in the State, according to F. G. Bamer, is in Lycoming County near Larry's Creek, Linden, and Salladasburg. Here more than two hundred farms on rounded hills have been handled in approximate strips since about 1865.[27] Strip farming in Montour County dates from 1896. On more than a hundred farms in Washington County strip farming has been practiced since 1915. Certain farms in Perry, Dauphin, Schuylkill, Northumberland, Indiana, Butler, and Huntingdon counties were worked in strips prior to 1933, when the Soil Conservation Service of the United States Department of Agriculture began to emphasize this particular soil-conserving practice.

Soil conservation is promoted not only by the adoption of special practices, as strip farming, but also by using those methods that are commonly considered to be indicative of "good farming." Some of these are the liberal use of farm manures and fertilizers; a rotation of crops that will maintain the organic content of the soil and thus increase its water-absorbing and water-holding capacity; the maintenance of steep land in permanent pasture; protecting the land with cover crops in winter; controlled grazing and the revegetation of pastures; the preservation of sod waterways in cultivated fields; contour planting and cultivation. These and other good farming techniques were followed by many Pennsylvania farmers long before special soil-conserving practices were introduced. The fertility of thousands of Pennsylvania farms has been enhanced, not wasted, under successive generations of good farming, especially farms on level or gently sloping land. Many farms now support two or three times as much livestock as they did fifty years ago, and the limit of their productiveness has by no means been reached.

In spite of effective soil conservation on a considerable number of farms, the general situation in 1933 was far from reassuring. There were large areas of "heart-broken land" as one discouraged farmer called it—"worn out," gullied, growing up to sprouts or yielding but a meager return for the toil of dispirited farmers. Such farms were mostly on sub-marginal land; their native fertility was low. Even more important was the usually unrecognized loss of fertile soil on good land by sheet erosion—the washing away of surface soil without obvious gullying.

In 1934 the Agricultural Experiment Station of the The Pennsylvania State College, in cooperation with the Soil Conservation Service of the United States Department of Agriculture, made a reconnaissance soil-erosion survey of the State and reached the conclusion that Pennsylvania contained 28,784,516 acres, exclusive of cities and water. Of this area, 14,079,392 acres, or 48.9 per cent, showed little or no erosion, while 14,650,123 acres, or 50.9 per cent, were affected more or less by sheet erosion, and 9,093,855 acres, or 31.6 per cent, were gullied. Damage by sheet erosion ranged from one fourth to three fourths of the top soil lost on 14,222,871 acres to where over three fourths of the top soil and some subsoil was lost on 427,252 acres. Gullies had destroyed 1,594 acres and severely damaged 230,765, and were found occasionally on 8,861,496 acres.[28] This picture was perhaps somewhat over-drawn, but the situation was serious enough at best.

PUBLIC AGENCIES IN SOIL CONSERVATION

The spark which fired national interest in soil conservation was the organization of the federal Soil Erosion Service, later the Soil Conservation Service, in 1933. The "Black Blizzard" of May, 1934, served to emphasize the urgent need for giving greater attention to this problem throughout the nation. During the high-price period of World War I, when even marginal land yielded a profit and rainfall was above normal, land in over a hundred range counties in the dry farming sections of Kansas, Oklahoma, Colorado, New Mexico, and Texas was broken by the plow for the first time.

For a few years all went well. Then a series of droughts accompanied by high winds, beginning late in 1933, stripped these parched farms of much of their topsoil and carried it away as dense clouds of black dust, some of which drifted to Pennsylvania, many hundreds of miles away. The sky was black at noonday. Fences, machinery, and even buildings in the range country were smothered by the drifting horror. Thousands of homesteads in the "dust bowl" were abandoned. A million defeated farm people took to the road in a pathetic migration, seeking a haven elsewhere. The devastation wrought in a few weeks or months by this wind erosion was matched in other areas, particularly in parts of the South, by the more insidious onslaught of water erosion. The public became aroused to this menace to our civilization.

The federal government had been concerned about this threat to the national welfare long before any effective action was taken against it. In 1928 the United States Department of Agriculture published a bulletin, "Soil Erosion a National Menace." In 1930 Congress authorized the establishment of several regional soil-erosion experiment stations to work out efficient methods of control. One of these was located at The Pennsylvania State College.

The first approach to the problem by the Soil Conservation Service was to establish soil-erosion control demonstrations, mostly in drainage areas of 8,000 to 25,000 acres. The Crooked Creek watershed of Indiana and Armstrong counties, in October, 1934, was the first such area organized in Pennsylvania. It comprised 115,000 acres. In a study of 458 farms in this area made in 1934 it was found that "From one-quarter to three-quarters of the original top soil has been lost from 49.8 per cent of the total farm land, and over three-quarters of the top soil has been lost from 19.2 per cent of the farm land."[29]

Other demonstration areas were established on the West Branch Octorara Creek, Lancaster County; Little Antietam Creek, Franklin County; and Beaver Run, Westmoreland County. Detailed soil-erosion control plans, covering a period of five years, were worked out by federal agents for all farms in these areas for which the owners requested this service. Under the cooperative agreement with farmers, the Soil Conservation Service helped to establish soil-conserving practices by contributing a part of the labor and materials required. The farmers agreed to supply the other necessary labor and materials and to follow the agreed-upon soil-conserving plan during the five-year demonstration period.

The labor required in the program was mainly for laying out contour strips, filling gullies, building drainage ditches to carry excessive run-off, seeding the steeper parts of the farm to pasture grass, planting forest trees on slopes which were so steep as to be unsuitable for agriculture, and sometimes for building terraces. The materials required were mainly machinery for the construction of drainage ditches and terraces, grass seed, lime, fertilizer, forest tree seedlings, and other soil-binding plants. In practice, however, the Soil Conservation Service supplied not half but most of the labor and materials, so that there was considerable pecuniary inducement for farmers to participate in the program.

The Soil Conservation Service established a number of Civilian Conservation Corps camps, recruited from the unemployed, in demonstration areas and used this labor on cooperating farms. By December, 1935, this agency had offices and technical personnel at Indiana, Lancaster, Waynesboro, Vandergrift, Clarion, Glen Rock, and Punxsutawney. Of the forty-nine Civilian Conservation Corps camps in Pennsylvania in 1939, seven were located on federal soil conservation demonstration areas.

In 1938 the approach of the Soil Conservation Service to the problem shifted from demonstration areas to cooperation with farmers in

Soil Conservation Districts. These districts were organized under the Soil Conservation District Act passed by the General Assembly in 1937. Under this act farmers in any part of the State, commonly a watershed area, could organize a Soil Conservation District by a majority vote of the land occupiers who participated in the referendum. The district then became a body politic, separate from county government, and could establish and enforce regulations for the use of land within the district with particular reference to soil-conserving practices. Compliance with these regulations was obligatory on all farmers within the district, whether they had voted in the referendum or not. In no instance, however, was the compulsory provision invoked in this state. Management of the affairs of the district was in the hands of officers elected by the farmers concerned; the Soil Conservation Service provided the necessary planning and technical assistance, without cost to the district. By 1940 ten Soil Conservation Districts had been organized.

The Soil Conservation Service was not the only federal agency engaged in the promotion of soil conservation in Pennsylvania. In May, 1936, another federal program was inaugurated under the Soil Conservation and Domestic Allotment Act of Congress. This "Agricultural Conservation Program" was successor to the Agricultural Adjustment Administration, or "Triple A," which had been declared unconstitutional by the Supreme Court of the United States. The primary purpose of this program was to exercise such control of crop and livestock production as to avoid national surpluses, but the approach to this problem was through the more general adoption of soil-building and soil-conserving practices; in the words of the act: "for the protection of the land resources against erosion, and for other purposes."

Unlike the Soil Conservation Service, under which little or no direct pecuniary inducement was offered to farmers to secure their cooperation, the Agricultural Conservation Program was a system of direct federal subsidies, or benefit payments, for the purpose of securing the more general adoption of certain practices favoring soil conservation, having constantly in view the major objective, which was crop and livestock control. Thus in May, 1936, there were two types of federal payments for which farmers could qualify: for growing soil-conserving crops, as grass, instead of soil-depleting crops, as wheat; and for the adoption of certain soil-building practices approved by the Secretary of Agriculture of the United States. This program, like the Soil Conservation Service program, was supposed to be administered locally by state, county, and neighborhood committees of farmers, but in practice the guidance was mainly federal. Thus was created the anomalous and indefensible situation of two branches of the federal government engaged in the promotion of soil conservation within the State and in competition with one another in certain respects.

The wisdom of some aspects of these federal activities may be questioned on the broad ground of national policy, especially the subsidies provided in the Agricultural Conservation Program; nevertheless, it is indisputable that they did greatly stimulate the more general adoption of soil-conserving practices. On hundreds of Pennsylvania farms soil building began to replace soil wasting. Although put forward in 1936 as an emergency measure, by 1940 the Agricultural Conservation Program had become so firmly entrenched that there was slight prospect that it would be discontinued after the emergency had passed.

Meanwhile the two State agencies most concerned with soil conservation, the Agricultural Experiment Station and the Agricultural Extension Service of The Pennsylvania State College, greatly enlarged the scope of their activities after 1933, the one through research, the other through counsel to farmers and demonstrations on farms. By 1940 the Agricultural Extension Service had 563 demonstrations of soil-erosion control practices, mainly strip cropping, on farms in sixty-three counties and reported that 1,600 other farmers had adopted this practice after observing its benefits on demonstration areas. Agricultural Extension representatives in each county, the County Agents, together with an augmented staff of Extension Specialists in agronomy and soil conservation, were constantly consulted by farmers on the use of soil-building crops, the establishment of permanent pastures, cover crops, strip cropping, reforestation, and other soil-conserving practices that had been recommended for many years by the Agricultural Extension Service. In the aggregate, the effectiveness of this service probably was fully as great as that of the more highly publicized and much more costly federal programs.

The distinction between the federal and State programs was sharply drawn. The federal agencies offered to farmers pecuniary inducements, direct or indirect, for their participation. The State agency, being part of an educational institution, operated solely through education; it gave farmers the information with which they could do the work themselves and at their own expense. The federal agencies emphasized the public interest in soil conservation; the State agency emphasized the personal responsibility of the individual farmer. These conflicting policies and programs often led to confusion among farmers and sometimes to wasteful competition and duplication of effort in the public agencies created to serve them.

BLIGHTED LAND

Soil erosion is not the only process through which soils have been lost or seriously impaired for agriculture. Pennsylvania is the industrial giant of the nation; her industries, especially coal, iron, and petroleum, have blighted many thousands of acres of once productive land, just as the growth of cities has made blighted areas of once attractive residential districts. When certain industries have had their way they have made gaping wounds in the countryside and choked and polluted once clear-running streams.

Some blighted land presents a scene of desolation comparable to that pictured in Dante's *Inferno*. The native beauty of Penn's Woodland has been smirched almost beyond recognition by great culm banks and spoil piles, denuded hills, dust-distributing breakers, huddled and shabby company houses. This process of exploitation and desecration has been going on for nearly a century. Above deep coal workings the land may sink or cave in; but blighted land is most in evidence where strip mining—the removal of coal from seams close to the surface—is practiced. During World War I, strip mining increased greatly: many hundreds of acres were ruined by excavations and dump piles. In most cases nothing was done to restore them.

Much of strip mining is done in small operations by farmers on their own farms. Strip mining does not require a heavy investment; all that is needed is machinery—power shovels, bulldozers, and trucks. Only the out-cropping coal is mined; where there is a heavy over-burden the operation is too expensive. Much strip mining is on poor land, but a considerable proportion is on land suitable for agriculture. After the coal has been removed, the land is left in a series of dumps, thirty or more feet high, interspersed with water holes ten or twelve feet deep. Some coal companies and a few individual operators have made an attempt to partially grade the worked-out diggings so that the land can be reforested; but for the most part they have left it in a condition utterly useless either for agriculture or for forestry.

Many once productive farms underlaid with coal have become a prey to the creeping paralysis of mining operations. In some cases the farmers sold them to coal companies for only a few dollars an acre more than their value for agriculture. Others, with greater business acumen, sold the mineral rights for ten dollars an acre and upward and then moved to town on the proceeds, leaving their farms to be operated by a succession of tenants each of whom took heavy toll of the fertility of the land. Still others accepted royalties on a ton basis.

The deterioration of farming in coal districts is one of the most tragic chapters in the agricultural history of the State. Speaking of conditions in the bituminous areas of southwestern Pennsylvania, in 1909, H. J. Wilder said, "Thousands of acres naturally productive are practically idle, and few farms are maintained at a stage even approaching their normal productivity. So keen has been the interest in mining and industrial development that good lands have been allowed to deteriorate very seriously, not infrequently to the point of abandonment."[30]

Parts of the anthracite coal region of northeastern Pennsylvania have met a similar fate. In 1870 Henry B. Plumb contrasted conditions then prevailing in Hanover Township, Luzerne County, with what they were in his youth: "Now, there was no tobacco produced, no flax, no sheep . . ., no wool, no honey, no bees-wax, no yarn, no cloth, no pork, no flour, no horses, no cows, no peaches . . . No care was taken of the apple orchards and the trees were suffered to die out and were not replaced . . . No game was now to be found in the woods . . . our river was without fish . . . There is almost nothing made here now, and nothing produced except coal. . . . The business of Hanover was once entirely agricultural, now it is entirely mining. Her future history while the coal lasts will be merely statistical . . . Her population will not be the owners, to any considerable degree, . . . and her owners will not be any part of her population."[31] Much of this decline may be attributed to the passing of the old order of self-sufficing agriculture but a large part was due to the operations of the mining industry.

The blighting effect of coal mining on farming in the Connellsville coke region was described in 1916 by a correspondent of *Pennsylvania Farmer:* "Here was one time a land of splendid farms and even more splendid farmers, who owned and farmed their own land. But lo, what a change the years have wrought! As the coal passed from the hands of the farmers into the hands of speculators and operators at what many farmers considered fabulous prices, these farmers no longer being dependent upon the labor of their hands for their daily bread, they were inclined . . . to take life easy. They moved from the farm and left it in the hands of tenants to do with it about as they chose . . . Much of the land now has fallen into disuse or is overgrown with the growth of neglect . . ."[32]

Until quite recently, companies which have purchased a large area of agricultural land in order to mine coal beneath it have made little or no effort to operate these farms efficiently; they have been turned over to soil-robbing tenants or abandoned until the time came to mine the coal.

Similar scenes have been witnessed in the more limited area of western Pennsylvania where the petroleum industry has become established. The existence of petroleum in that region had been known from the days of Indian occupancy, when small quantities were skimmed from springs and streams for medicinal use. The "boom days" of petroleum began on August 28, 1859, when Colonel E. M. Drake struck oil in an artesian well near Titusville, Crawford County, at a depth of seventy feet. It yielded 400 gallons a day. Other wells sunk in the vicinity had a flow of 3,000 to 4,000 gallons a day for a few weeks or months;

then pumping became necessary. Excitement mounted. Derricks began to dot the countryside. Land values, especially up and down Oil Creek and the Allegheny River, soared to almost unbelievable heights.

Speculation in supposedly oil-bearing lands and in the stock of oil companies was rampant. The public, including many farmers, was the victim of the swindlers who always accompany bonanza mining. The story of this hectic period has been told by A. K. McClure, an eyewitness of the scene: "Fabulous fortunes were made in a year by . . . fortunate operators . . . Promoters and speculators swarmed through Venango, Crawford, Warren and Forest counties, buying and leasing lands without regard to their location, and in most instances with no evidence that oil was to be found beneath them. With these land purchases and leases as a basis, hundreds of stock companies were formed and the stocks sold . . . everywhere where men and women with small or large savings could be induced to invest upon a promise of becoming millionaires within a year."[33]

Farmers were the chief losers in this speculative orgy. A few sold their land for high prices; thereafter they were lost to agriculture. Others invested the savings of years, including the proceeds of mortgaging their farms, in the stock of wildcat oil companies and lost both savings and farms. Throughout the oil territory farmers tended to neglect their land; why laboriously scratch the soil for a livelihood when a fortune lay just below the surface? Thousands of acres of once productive land reverted to nature, much of it permanently.

The speculative bubble burst in 1866; thereafter the oil industry became established on a more stable basis. The record of this effervescent period is written in the hundreds of abandoned wells and rusted pumps that dot the landscape and in abandoned farms.

Still another blight on farm land in some parts of the State has been the smoke, soot, and noxious fumes of coke ovens and other industries. Some industrial fumes, especially sulphuric-acid gas from the combustion of coal in quantity, as in coking and in the manufacture of minerals rich in sulphites, are very injurious if not positively deadly to vegetation. In 1909 H. J. Wilder described the effect of coke-oven fumes on adjacent farm lands in western Pennsylvania: "In the immediate vicinity of the ovens the gaseous fumes and heavily laden smoke kill all vegetation, and consequently leave a gruesome landscape. So complete is this destruction that not a living thing can grow for as far as the heavy clouds of smoke extend in the direction of the prevailing wind . . . Within this 'dead line' all trees are killed and no grass remains, the ground being bare and unsightly. The safe cropping distance from the ovens is variable, but the smoke injury is most marked for an average distance of half a mile."[34] In recent years some progress has been made in the abatement of this nuisance by the use of smoke-consuming devices and the reclamation of industrial wastes.

Blighted land, fortunately, is but a fraction of the total farm area of the State. The great majority of farms are still uncontaminated. If William Penn could again set foot upon the shore of the Delaware and tour the state that has been created from his Woodland he would have reason to exclaim again, as he did in 1682, "It is a goodly land."

Corn husking

II

Characteristic garb of a Mennonite farmer (left) and an Old Order Amishman

THE FARMERS

WITH THE great upsurge of the industries after 1840, farmers lost the commanding numerical and economic position that they had held since the founding of the colony. They now are but a fraction of the total population. The decline in relative numbers was due partly to the development of labor-saving machinery; one man now can do the work that formerly required several men. It is significant, however, that in spite of the marked reduction in acreage under cultivation and in the number of farmers since 1900, production has increased, not decreased. The major ethnic groups of colonial days still prevail; the great majority of farmers are of English, Scotch-Irish, and German descent, with the last group predominating.

FEWER AND MORE EFFICIENT FARMERS

Evidence of the paramount importance of agriculture in 1840 is found in the census statistics for Chester and Lancaster counties for that year. The number of persons employed in various occupations were:

	Agriculture	*Commerce*	*Manufacturing and Trade*
Chester County	11,571	365	4,558
Lancaster County	10,825	250	3,928

For the State as a whole the numbers were: Agriculture, 3,719,951; Commerce, 117,607; Manufacturing and Trade, 791,739; Other Occupations, 169,562. Agriculture was the dominant industry throughout the State. Until 1820 more than ninety per cent of the working population was engaged in agriculture. By 1870 farmers were in the minority and by 1940 fewer than ten per cent of the people were farmers—905,000 out of 9,426,989.

M. E. John has recorded the ebb and flow of farm population in response to economic and social shifts.[1] From 1840 to 1900 the State had a phenomenal growth. Practically all counties showed substantial gains. The most rapid growth of cities was between 1890 and 1900; rural counties gained only 23,000 in that period while cities gained 1,020,000. The downward trend in farm population began about 1900. By 1910 many rural counties (Bedford, Bradford, Cameron, Crawford, Forest, Fulton, Juniata, McKean, Montour, Perry, Pike, Potter, Snyder, Sullivan, Susquehanna, Tioga, Wayne, Wyoming) had declined in population. "Since 1910," said the Pennsylvania Department of Agriculture in 1927, "the estimated net annual decrease has averaged between eight and nine thousand persons. In that year, 13.7 per cent of the total population lived on farms; in 1925, the percentage had fallen to 9.7 per cent. . . . In 1820, they [agriculture, etc.] afforded work for over two-thirds of the gainfully employed; in 1920, the ratio had dropped to less than one-eighth."[2]

By 1920 the population growth of the entire State had begun to slacken. The cities continued to grow at the expense of the country, but much more slowly. This trend was reversed temporarily between 1930 and 1940, when many industries closed as a result of a severe economic depression. Thousands of rural young people, especially in the western Pennsylvania soft coal and steel districts, who had tried their fortunes in the city, began to drift back to the country. The increment in farm population during this trying period was seven per cent.

Pennsylvania is a state of widely-scattered industries. In 1940 there were more than twice as many "rural non-farm" people as farmers. These were employed in industries and lived in small towns (less than 2,500). About one fourth of the total population in 1940, or two and a half millions, were rural residents not engaged in agriculture. In 1940, forty-three of the sixty-seven counties were predominantly rural and twenty-four predominantly urban.

The loss of rural population between 1880 and 1920 was particularly heavy where lumbering had been a major industry but was now becoming practically extinct. The loss in Pike County was 48 per cent; Susquehanna, 44 per cent; Bradford, 37 per cent; Crawford, 30 per cent; Juniata, 29 per cent; Perry, 28 per cent; Wyoming, 24 per cent; McKean, 23 per cent; Tioga, 22 per cent; Wayne, 22 per cent; Clarion, 20 per cent; Cameron, 20 per cent. These, however, were mainly subsistence, not commercial farmers; they contributed little to the food supply except that of their own families.

ETHNIC GROUPS

The ethnic character of the farm population has not changed materially since early colonial days. Eighty-five per cent are white, native, and of German, Scotch-Irish, or English ancestry. In some counties, as Snyder, Union, and Juniata, close to ninety-nine per cent of the farmers are native. This is in marked contrast with the situation in some of the newer western states where half or more of the farmers are immigrants. By far the largest group is the Pennsylvania Germans.

Between 1840 and 1890 there was a wave of immigration from Ireland due to "hard times," particularly from the scourge of potato blight. By 1890 the Irish were the most numerous foreign-born in the State. Few of these new citizens became established on the land. They met the demand for industrial labor; they mined coal, built canals and railroads, and worked in industrial plants. There were also some German and Welsh immigrants during this period.

Beginning about 1890 there was a marked change in the character of the immigration. It came mostly from southern and eastern Europe instead of from northern and western Europe, and was predominantly Italian, Polish, Russian, Czechoslovakian, Austrian, and Lithuanian, though a considerable number of Irish and Germans continued to knock on the door of Penn's haven for the oppressed and under-privileged. Practically all became workers in the industries. Some now were beginning to acquire farms, especially those of the second generation. The census of 1920 reported 14,522 foreign white farmers and 451 colored farmers. A large proportion of them were part-time and subsistence farmers.

It is probable that Italians and Poles will turn to the land in increasing numbers, as they have in New England and New Jersey; but there is no early prospect that these hardy sons of the soil will dispossess German farmers, even though they match them in industry and thrift. It will require several generations to acquire the lore of the land which has been handed down from father to son among the Germans since colonial days.

In spite of the great influx of new stock, the dominance of the three ethnic groups that settled the State has not been threatened. Pennsylvania agriculture is one of the most stable in the Union. Recent national immigration laws indicate that this situation is likely to continue and that the era of the open door to people from all parts of the world is at an end.

By 1860, when railroads had penetrated the countryside, and manufactures had largely supplanted home industries, the provincialism of Pennsylvania farmers began to break down. The line of demarcation between "English Pennsylvania," "German Pennsylvania," and "Scotch-Irish Pennsylvania" gradually disappeared. As their contacts with other farmers multiplied, farmers became more homogeneous. They no longer viewed all strangers with suspicion. Many distinctive nationalistic traits and neighborhood customs have been retained to this day, but farmers have become cosmopolitan—citizens of the world. It is no longer necessary, as it was a century ago, to distinguish between farmers of different nationalities.

The great body of Pennsylvania farmers are of German ancestry, and many speak "Pennsylvania Dutch" as well as English. They commonly use the vernacular at home and among themselves, otherwise they are not distinctive save in their uniformly good farming. Since 1900, the anglicizing of Pennsylvania German has proceeded at an accelerated pace under the influence of consolidated schools and much freer avenues of trade. More English words are constantly being added. It is reasonable to expect that within a few more generations the dialect will fall into disuse except among certain ultra-conservative groups, as the Amish and Dunkers.

The "Plain People"

Because they are by far the largest group of farmers in the State, there is a tendency to dwell on the agricultural virtues of the Germans to the practical exclusion of the English and the Scotch-Irish, who, nevertheless, constitute as efficient a body of farmers as can be found in any state. The Amish and the Dunkers, in particular, have received a great deal of acclaim as unusually successful farmers, especially the Amish. These are a small ultra-conservative branch of the Mennonites, a sect comprising about 25,000 German farmers in this State. The Amish and the Dunkers are called "Plain People" because of their simple habit of dress, strict religious views, and anachronistic way of life. They do not "conform to this world," hence they are in the public eye. There are two groups of Amish, the "Old Order" or "House Amish," who worship in homes and are the more conservative; and the "Church Amish," who worship in churches.

The center of Old Order Amish is Leacock Township, Lancaster County. Practically all of the 3,500 Amish in that county are in one community which stretches eastward from the city of Lancaster for about twenty-five miles and is nearly fifteen miles wide at the eastern end. Other important outposts of the faith in this State are the southern part of Lebanon County and the western part of the Kishacoquillas Valley, Mifflin County.

Before the Amish came to the New World they had lived for centuries under governmental restrictions which confined them almost exclusively to farming. "This tradition," says Walter M. Kollmorgen, "plus their desire to perpetuate themselves as a peculiar people, has resulted in church regulations prohibiting residence in towns and cities and the pursuit of occupations not closely related to farming. The community has, therefore, maintained a strictly rural way of life."[3] The Amish believe that their marked success in farming is a form of divine blessing. "In no other outstanding agricultural community in this country," says Kollmorgen, "has so much of the 'old order' been retained [as in the Old Order Amish of today]. Although the old order applies more particularly to religious and social values than to agricultural programs, there is a close tie between religion and agriculture among the Amish. It is doubtful that any other socio-religious body has so consistently distinguished itself in agricultural enterprise as the Mennonites, of which larger religious body the Amish are a part . . . [They] have created and maintained garden spots in other parts of Germany, in Russia, in Mexico, and in several States of this country."[4]

A large part of the success of the Amish arises from their feeling of responsibility for maintaining the fertility of the soil. "Their very faith teaches them," says *Pennsylvania Farmer,* "that they are stewards of God's acres over which for the span of life they hold title. Every Amish father and mother seeks to make it possible for each son in the family to have a farm of his own. Where this is not possible others of the faith who can come to their assistance. . . . To continue the tradition, homesteads must be divided to provide for the sons or new farms must be purchased. The result of this is written over much of the best farming sections in Lancaster County. It is small farms . . . relatively high priced land and eventually . . . the question of finding land where value is in line with what it will produce."[5]

Non-Amish farmers have been gradually crowded out of predominantly Amish communities, having been lured to sell by the high prices that the Amish are willing to pay for good land. During the quarter century from 1915 to 1940 the Amish have bought every farm in Leacock Township that was sold but one, and that was sold on Sunday when no Amishman will do business. "In general," says Kollmorgen, "the church people among the Pennsylvania Germans responded more readily to the appeals of industrial opportunities, urbanization, and higher education than the sectarians, such as the Mennonites, Amish, and Dunkers (Brethren)." In certain districts the Amish, who have almost completely resisted higher education, are beginning to take over the farms of the church Germans. "In Lancaster County, the choicest farm lands long ago fell into the hands of these sectarians, including the conservative Mennonites, who have refused to send their children to high schools and colleges. Education, with its emphasis on urban ideals, does build bridges that lead away from the farm."[6] This, however, is not necessarily a disadvantage, considering the interests of the country as a whole.

The Amish have had marked success in training their chldren to be farmers. "Youngsters are assigned definite tasks at an early age," says Kollmorgen. "Boys and girls 8 and 9 years old are already a great help in the house and in doing chores and field work. . . . Frequently these youngsters are given a calf, pig, sheep, or some chickens to raise and market, or they may be given a small plot of tobacco to tend and sell. . . . The Amish boy is a well-trained farmer . . . by the time most children graduate from high school."[7] An increasing number of young Amish, however, become "worldly." They are moving into non-agricultural occupations, as mechanics and restaurant keepers, and catering to the ever-increasing tourist trade. Some are driving automobiles instead of the traditional horse and buggy. Nevertheless, the Amish are keeping about four-fifths of their young people in the old way of life; this is quite remarkable considering the manifold temptations to which they are constantly exposed, being surrounded on all sides by "the world."

W. Henry Boller pays this well-deserved tribute to Amish farmers: "It is not hard to connect these quiet, sturdy folks with the well-kept house and barns behind them . . . The whole community . . . breathed of frugality, of thrift, of hard, back-breaking labor, and, above all, of peaceful folks secure and unwavering in their trust in their good and well-tended acres . . . Year after year [the Amishman] raises crops, sells them for what he can get, spends less than he makes, and works from sun to sun . . . He is one of the best farmers in the world, bar none."[8] The same might be said of many Pennsylvania farmers of other nationalities and religious faiths as well as of the highly-publicized Amish.

PART-TIME AND SELF-SUFFICING FARMERS

As might be expected in a state with as rugged a terrain as Pennsylvania and with highly developed industries, there are a large number of part-time and self-sufficing farmers; they produce little if any food to sell, but use it on the farm. In 1939 there were "66,798 Pennsylvania farms . . . with 'farm products used by farm households' as the major source of farm income . . . Most of these farms were occupied by elderly or handicapped people or by people with an occupation besides farming."[9] Thus over one-third of Pennsylvania farms in that census year were non-commercial.

Part-time and self-sufficing farms are most numerous in the Allegheny plateau and mountain region. In 1939 more than half the farms in that region were of this type. In several of the north-central counties, where less than ten per cent of the land is in farms and half or more of each farm is in woodlot, this type of farming is the rule; there are few commercial farms.

Self-sufficing farming was dominant over most of the State prior to 1840. Part-time farming, also, is not a new aspect of Pennsylvania agriculture. From earliest colonial days there have been men—many more than at present—who have drawn part of their living from the soil and part from employment in crafts and industry. Lack of stable employment in industry at times turned them toward the land, where vegetables can be grown for family use, a cow can be kept to supply milk and butter, and pigs and hens to supply meat and eggs, and shelter is much cheaper than in towns.

There are two types of part-time and self-sufficing farmer; the aged and unemployed who has withdrawn from towns under economic pressure, and the under-privileged or inefficient farmer who seeks to supplement his meager income by working part time off the farm. Most part-time farmers have poor land and small acreage. The proximity of coal mines, textile and steel mills, and ceramic and other industries provides the same opportunity for part-time employment as the home crafts and industries did a century ago.

Part-time farmers are found in every county but are most numerous in the anthracite counties of Schuylkill, Luzerne, and Lackawanna, the bituminous counties of Cambria, Somerset, and Clearfield, and in counties where lumbering was a major industry half a century ago. Forest County, with seventy-seven per cent of its farm operators working part-time off the farm in 1935, leads in this respect. The average for the State that year was thirty-seven per cent. There is some part-time farming even in the richer farming districts. In 1929 the Old Order Amish of Lancaster County supplemented their farm income by working off the farm an average of 116 days. Share croppers in that county, with an average of three and a half acres in tobacco and truck, averaged 177 days of outside employment.

The average commuting distance of part-time farmers to their off-farm employment was six miles in 1935, the average size of farms was 20.8 acres, and the total investment, including the home, about $3,000 for owners.[10]

Pennsylvania farmers engage in supplemental employment far more than is commonly realized. "There were 57,095 farm operators who reported working off their farms at non-farm work for pay or income, with an average of 162 days of such work in 1939. Almost one fourth of the farm operators of the State reported 100 days or more of non-farm work . . . In Cameron County 64 per cent of the productive work of farmers was non-farm employment."[11]

Another type of part-time farmer was brought forcibly to public attention during the years of industrial depression, 1930-1940. Good roads, the automobile, and widely dispersed industries made it possible for many hard-pressed town families to locate temporarily on a small tract of land, usually not over twenty acres. The income was not large but it helped. In a study of 887 such farms in 1936 it was found that "the average receipts per farm were $621. The average income . . . was $189 per farm. Approximately one-half of this amount came from supplying home-grown products to the family table . . . A garden, a cow, a hog or two and an adequate flock of hens are the enterprises which usually give the greatest returns."[12] These little farms also provided a more satisfactory way of life, a better place to raise children, and a cheaper place to live.

Some of those who fled the cities during the depression years had such low incomes that they became a rural social problem. "Rural slums" were found in all parts of the State. The families lived in rude shacks and often did not raise enough to justify the designation of farmer. M. E. John made a study of these outcasts in 1940 and reported, "A majority of the 321 families interviewed . . . had annual cash incomes of less than $600. These were derived from private industry, agriculture, and government aid . . . A majority of the group was of rural background . . . Their shacks were located generally on the poorer economic land classes . . . The dwellings were small . . . Many were built of rough lumber . . . unfinished inside. Running water and electric lights were seldom available. As a group, the people who lived in these flimsy houses seemed to be satisfied with their surroundings."[13] Possibly that is why some of them continued to be "underprivileged."

CITY FARMERS

The "gentlemen farmers" of the early days of the Commonwealth, those cultured gentlemen who gave the first great scientific impulse to Pennsylvania agriculture through the Philadelphia Society for Promoting Agriculture, are still with us but are far less active. Modern well-to-do patrons of agriculture are, for the most part, too absorbed in developing impressive show places to be fired with zeal to advance agriculture through experimentation, as did their progenitors. Some, however, are true lovers of the soil. Most wealthy people who acquire farms near the great cities undertake to breed livestock, a fancy which they can afford to gratify. To them the farm is a restful diversion from the cares of business, to be operated for pleasure, not for profit. There can be no quarrel with them on this score, but the presence of a number of city farmers in a community tends to have a demoralizing effect on the prevailing wage scale and to give land in the vicinity a fictitious value.

An increasing number of retired business men take up farming. Some of them, having been successful in business, feel that they surely can be, also, in such a simple occupation as farming; that agriculture should be as amenable to exact business procedure on a cost-plus basis as merchandising. They invest heavily in land, buildings, equipment, and livestock, and pay premium wages. They expend their impatient energy upon the patient earth and harass her bosom with many ill-considered schemes. In a few years their discomfiture is complete. Such men—they are not farmers, merely land owners—are a handicap to any rural community.

On the other hand, some city business or professional men who acquire land become, in time, good farmers. They are especially proficient in merchandising their products and look well to all the business aspects of the farm enterprise. Although the heinous crime of being "book farmers" may be charged against them by some of their more conservative neighbors, this is as likely to be a commendation as an opprobrium. Some of the most successful farmers in the State are retired business men.

The age-old urge of people in every walk of life to possess a bit of ground sends hundreds of city dwellers, of moderate means or none at all, into the countryside every year, hoping to find their Eldorado. The back-to-the-land movement was especially in evidence from 1912 to 1916 and from 1930 to 1938. The high cost of living was an important factor in this migration. The idea that "anybody can farm" is still astonishingly prevalent, especially among those who have not achieved success in the city. The truth is that those who have not been successful in the city are not likely to be so on the farm either, especially if they have had little farm experience. Poultry raising seems to have a peculiar fascination for back-to-the-landers as a get-rich-quick enterprise. The result may be disillusionment; count the abandoned poultry houses in the State that were built by inexperienced amateurs.

In the summer of 1852 that eminent violinist and romantic idealist, Ole Bull, with 105 of his followers, founded an ill-starred Norwegian colony on Kettle Creek, Potter County, and built a castle in the then almost unbroken wilderness. This attempt at collective farming failed, as did all others—at Ephrata, Lancaster County; Azilum, Bradford County; Harmony, Butler County; Celestia, Sullivan County.

In 1933 Congress established the Rural Resettlement Administration. This agency made extensive plans to remove under-privileged farm families from poor to better land at government expense. This was essentially a relief measure. It developed, however, that most of these farm families did not desire to move; they would rather have a meager existence on their own land, poor though it was, than to revel in fat acres supplied elsewhere by the government. The scheme was a failure.

In 1934 the federal government also founded Westmoreland Homesteads. This enterprise was described by *Pennsylvania Farmer:* "An interesting experiment in subsistence and collective farming is beginning in Westmoreland County, Pa., under the auspices of the Civil Works Administration. About 1,400 acres of land has been secured, part of which will be divided into two-acre homesteads. Here the residents will be expected to produce their vegetables, fruits, poultry and eggs, working their plats by hand. Each family will have, in addition to its two-acre farm, one unit of interest in a collective farm operated by a manager with the labor of the homesteaders, each of whom is to get his share of the products of the big farm—meats, milk, butter, cheese or whatever is produced."[14] The families were recruited mostly from the cities. This was an adaptation of the collective farming of Russia. Westmoreland Homesteads was as impracticable as Ole Bull's plunge into the wilderness. It may be considered as merely a temporary relief measure or as a social experiment underwritten by the government.

FREEHOLDERS

"Who are the laboring people of the North?" asked Daniel Webster rhetorically during the momentous debates in Congress that preceded the Civil War. He answered his own question: "They are the people who till their own farms with their own hands; freeholders, educated men, independent men."[15] The spirit of independence and free enterprise has been characteristic of Pennsylvania agriculture from its beginning. This Commonwealth exceeds all other states but three in the percentage of farms operated by owners—seventy-one per cent in 1935, as compared with forty-nine per cent for the United States as a whole. The proportion has been fairly constant since 1880.

"From the beginning," says the United States Department of Agriculture, "the people of the United States have emphasized private enterprise and private ownership of land, with a minimum of governmental interference . . . Land ownership is a bundle of rights including the right to use (or abuse), improve or dispose of the land owned . The Federal Constitution, as interpreted by the courts, defines the jurisdiction of the Federal Government, leaving to the states the remaining jurisdiction. No regulatory power over privately owned land is specifically granted to the Federal Government."[16] This statement would be more reassuring if the same governmental agency were not now controlling the use of a large area of privately owned land, indirectly, by offering federal subsidies for compliance with regulations that it has established.

The editor of *Pennsylvania Farmer* has stated the paramount advantage of being a freeholder: "Meeting and overcoming natural handicaps, and the spirit of independence and interdependence that comes from the ownership of home, have made a type of manhood and womanhood that can never be replaced by peasantry or mere hands in a great farm enterprise. Sorry the day when farming ceases to be a character-building, home-developing institution and becomes a mere business."[17]

Cornelius Weygandt, who knows the Pennsylvania countryside, especially the "Pennsylvania Dutch country," as do few other men, sings of the joys of the freeholder: "An eighty acre farm in the garden spot of America . . .; a well stocked stone house and barns . . .; a home yard of shrubs and herbs and flowers; a wife and a full quiver of clean-blooded children; the respect and cooperation of his neighbors; joy in his work; and, last but not least, a pacing mule: such a combination should make any man happy, if he have the luck to have the country heart, and that all but all Amishmen have."[18]

Most Pennsylvania farmers are deeply attached to their land. They are permanent residents, hence they are not unduly discouraged at recurring hard times nor unduly elated at occasional periods of unusual prosperity. Son and grandson succeed to ownership of the ancestral acres as a matter of course. A southern share cropper, long accustomed to moving from farm to farm in order to secure some fancied advantage in soil or location, would exclaim if he saw the substantial farm homes and great bank barns of Pennsylvania, "Why, these farms have houses and barns on them as though the people intended to stay." And so they do. This is the beginning of a permanent agriculture.

The philosophy of life of thousands of Pennsylvania farmers has been expressed by O. E. Baker: "Prosperity alone cannot preserve our democratic American agriculture . . . It must be associated with the preservation of the rural home and family, the maintenance of rural institutions, particularly the church and a truly rural school . . . Continuity of family proprietorship in farming is essential . . . The conditions of living and the philosophy of life in the cities are not conducive to the integrity of the family or the preservation of democracy. It is becoming clear that the land is the foundation of the family, and that the family is the foundation of the democratic State."[19]

Many old farmers are a rich repository of rural wisdom accumulated since colonial days. Not only farms, but also well-tested methods of farming, have been handed down from one generation to another. This hereditary experience constitutes a great unwritten book on farm practice. The pioneer stock laid the foundation of a sound social order; after more than two centuries their descendants still maintain it.

Farm journals contain many references to farms that have been hallowed by the devoted labors of fathers and sons for many generations. A few of these may be cited:

Springdale Farm, Pennsbury Township, Chester County, was bought by Benjamin Mendenhall from William Penn in 1684; by 1923 it had been in the same family for seven generations.[20]

In 1923 Charles B. Landis, of Landis Valley, Lancaster County, was the seventh generation of his family to own and operate the farm for which the original patent was granted by William Penn in 1718. The twelve-room stone house erected in 1728 was still in use.[21]

In 1925 Neshaminy Farms near Rushland, Bucks County, had been in the hands of the Wilkinson family for 212 years.[22]

In 1721 Garrett Brownback, who came to America in 1695, settled on a tract of land in Chester County. In 1923 it was stated that two hundred and twenty of the original 950 acres had never been out of the family.[23]

In 1717 John Weaver emigrated from Switzerland and settled on a tract of land in Lancaster County. In 1925, another John Weaver, his descendant, still owned it. The farm "produces better than it did years ago, according to my father, who can remember back eighty years or more."[24]

In 1923 the Poublan family of France had been in possession of their land for 900 years, having passed it down from father to son for twenty-four generations, and the twenty-fifth was awaiting his turn. No Pennsylvania farms have yet achieved this great antiquity, but they have achieved a degree of continuity and stability not realized elsewhere in America.

TENANT FARMERS

April first is All-Fool's Day. It also is moving day, when tenant farmers commonly "flit" from one farm to another. In early times, when most farm leases were for one year only, All-Fool's Day was a very appropriate time to make the shift. As long as the tenant had no assurance that he could remain on the farm more than one year it was natural that he should seek to get all he could out of the land, with little or no consideration for the maintenance of its fertility. Fortunately, this vicious practice has long since been abandoned in Pennsylvania. The census of 1935 revealed that fifty-four per cent of all tenants have operated the same farms for ten years or longer; and seventy-three per cent for five years or longer. Moreover, the terms of the prevailing tenancy contract tend to husband soil fertility.

Farm tenancy in Pennsylvania reached its peak in 1900—twenty-six per cent. By 1925 only one farm in six was operated by a tenant.[25] The higher the fertility and value of land, either by reason of proximity to cities or of high productive power, the more difficult it is for a poor man to acquire a farm and the higher the percentage of tenancy. The range in 1925, excluding Philadelphia and Allegheny counties, was from forty-one per cent in Lancaster County to less than three per cent in Carbon County. "This is a situation," says Thomas Carver, "which contains possibilities of evil in the form of separating our rural population into two groups, the landowners and the landless. Such a separation of classes has never failed in the history of the world to breed jealousies and animosities."[26] This stage has not been reached in Pennsylvania.

Farms are leased for an annual cash rental or for a specified share of the products. Share tenants predominate except near large cities where farms are held for future real estate development; in 1925 nine out of every ten farms in Allegheny County were rented for cash. The most popular form of lease is the half share, the tenant supplying all equipment and livestock and half the seed; sometimes the division is one-third and occasionally two-thirds, according to the relative contributions of lessor and lessee. Most lease forms originated a century or more ago when crop production was the major part of the farm enterprise, whereas now it is livestock; hence they often need revision.[27]

Tenancy is not necessarily a handicap. Some farmers are tenants by choice, preferring to invest their limited capital in livestock and machinery rather than in land. Others are tenants on farms owned by relatives. This is especially true of young men who are trying to get a start in farming; in time they will be freeholders. Three out of four farmers under twenty-five years of age are tenants, but only one out of five of those over fifty-five years of age.

Tenancy may be used as a form of rural credit. A hard-working young man of good character and outstanding ability may be able to rent a fully equipped farm on shares, without making any capital investment. He matches his time and youthful strength against the farm of another who is about to retire because of advancing age, ill health, or financial competence. Under such circumstances tenancy is merely a convenient stepping-stone between two successful ownerships. Tenancy also results from the prosperity of farmers who accumulate enough of this world's goods to buy additional farms, which they rent.

FATHER AND SON PARTNERSHIPS

Among Pennsylvania German farmers a son or some other relative or a coreligionist frequently becomes a tenant. The high percentage of tenancy in Mennonite and Amish communities is evidence of prosperity, not of poverty. "A young Amishman who climbs the agricultural ladder," said Walter M. Kollmorgen, "(1) begins as laborer, (2) becomes a one-third share tenant, (3) then a one-half share tenant, (4) next a cash tenant, (5) and finally an owner . . . As full-time day-laborers they may earn from $200 to $400 a year. When they become more mature [they] will combine day labor and cropping tobacco and so realize . . . $600 to $1,000 a year. The accumulated money may be invested in some stock and machinery, so that renting may then be done on a half-and-half basis or for cash, preliminary to buying a farm . . . Many of them manage to get farms not many years after they are married, although . . . until they become of age, their earnings are usually retained, spent, or invested by the head of the household."[28]

Joint operation of a farm by father and son or sons is quite common. "When a man has spent the best years of his life in developing a successful business," said Paul I. Wrigley, "it is very comforting to feel that one or more of his children will be able and willing to carry on the business when he no longer can do so . . . Less than five per cent of the farmers in 1946 had working arrangements with adult sons in the operation of their farm businesses. The chief reason why so small a proportion of grown sons stay on home farms is that the average Pennsylvania farm does not have sufficient productive work to keep two men fully employed or sufficient income to support two families adequately . . . Another reason is that only about one farm in four has more than one dwelling. Parents often are unwilling to face the fact that they are getting old and that their children have become men."[29] The most common agreements between father and son were: (1) payment of wages; (2) payment of wages plus a bonus; (3) renting the farm; (4) partnership. A high percentage of the partnerships were mutually satisfactory.

It has been the commonly accepted idea that the retired farmer and his wife should rent the farm, have a sale, and move to town. The State is full of peaceful rural villages where aging men and women, their period of active work on the farm over, await the sunset of life. Leaving the farm means giving up life-long friends and neighbors and becoming adjusted to a strange environment. In town, the farmer misses the daily round of chores. His hands ache for the feel of the axe and the plow handles. He misses the collie that was his shadow on the farm. His wife misses the familiar household routine and the visits of neighbors. Often they are unhappy for something to do. In many cases it would have been better to have stayed on the farm and employed a man and woman to do the work. Moreover, living is cheaper in the country. During the depression of the 1930's a correspondent of *Pennsylvania Farmer* wrote: "In our section many retired farm owners who have been living in town for six or eight years are moving back to their farms. They are forced to do this because the income from the farm cannot now keep them in town."

There is a much larger proportion of aged farmers now than there was a century ago because of better diet, better knowledge of the laws of health, and better medical care. In 1860 only one person out of forty-five was sixty-five years or older; in 1940 one out of sixteen. Americans are the most aged people on the earth. The Social Security Act of August 14, 1935, did not apply to farmers.

ASSOCIATED CRAFTS AND INDUSTRIES

Prior to 1840 many farmers were also craftsmen or were engaged part-time in home industries. The relative merits of home and factory production were the subject of bitter discussion between 1830 and 1860. By 1850 factory-made goods were beginning to displace home-made goods. One by one the crafts and industries of the farm and rural village were taken over by urban factories. Cornelius Weygandt summarizes the situation in a self-sufficing rural village in Pennsylvania in 1855: One such in northern Lancaster County (New Holland) had shops of the following artisans: cabinet maker, tannery, coach factory, saddler, pottery, brass foundry, blacksmith, plow maker, tinsmith, carpenter, painter, bricklayer.[30] Many of these local craftsmen and artisans were also part-time farmers.

Some of the old rural crafts, particularly chair making, cabinet making, basket making, are still practiced by a few, especially Pennsylvania Germans. Only a few years ago the State was dotted with little shops for the manufacture of wood into household and farm equipment. No state has more furniture made locally from black walnut, cherry, sugar maple, and its unusual variant the curly maple. It is rare now to find cherry and black walnut boards equal in width to those used in old table tops and the ends and tops of chests and corner cupboards. Some farmers' wives still supplement the family income by making and selling hooked and braided rugs and other products of household art.

The rural industries which formerly occupied part of the time of many farmers have largely vanished under the impact of the new economic order in which the farmer has become a specialist. In 1850 the iron industry still was prominent in central Pennsylvania, especially in Huntingdon, Blair, and Centre counties. Farmers have helped to work the great iron mine at Cornwall, Lebanon County, since early colonial days. The surface iron ore deposits of central Pennsylvania, once extensively worked, together with the charcoal furnaces associated with them, furnished much supplemental employment to farmers. After 1870 these iron furnaces were gradually abandoned, being unable to compete with the higher grade ore of Lake Superior.

The twenty-four woolen mills in Pennsylvania in 1810 had increased to 324 in 1880 and were widely scattered in rural districts. Many farmers' sons and daughters found employment in them. By 1900, however, practically all the woolen and worsted mills of the State were in or near Philadelphia. Until about 1880 much of the ready-to-wear clothing was made by farm women; the town merchant provided the materials and sold the finished product, paying the worker a commission. The sewing machine, invented in 1846, revolutionized clothing manufacture; after 1880 it was transferred from the home to the factory, where it was done much more expeditiously although somewhat less efficiently.

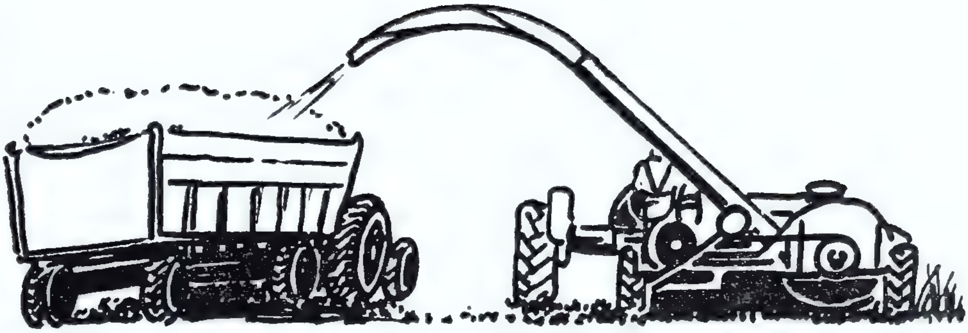
With the loss of home industries it became a problem—to some men, at least—to find other employment for their women-folks. "The traditional ethics of rural Pennsylvania," says Percy W. Bidwell, "required all to be producers and none merely consumers. No one knew what evil work the Devil might find for idle hands to do, especially if they were the hands of women. The men felt that their daughters would be less well qualified to make good and profitable wives." The problem of finding new work for farm women was met, in part, when they left the farm to take employment in urban centers, factories, and shops, or as school teachers or domestics. Ultimately they invaded many other vocations hitherto reserved solely for men.

Among the last rural industries to succumb to industrialization were those based on the processing of farm products. Of these, flour milling was the most important. Pennsylvania led the colonies and the nation in this respect until 1860. The industry centered at Philadelphia but there were numerous small mills in all parts of the State, especially in Lancaster, York, and Berks counties. The miller often was a part-time farmer. By 1900 country water-ground flour had been largely superseded by "patent flour"; then the picturesque old mills, with their ponderous wheels and laboring burrs fell into disuse or were used chiefly for grinding coarse "chop" for stock feed.

After 1880, hunting and fishing, which had been important supplemental sources of food, were engaged in almost solely for sport. Trapping, which formerly had occupied profitably part of the slack winter season, became mostly a diversion for farm boys who aspired to buy a new gun or a new "bike." Muskrats and skunks now predominate, with an occasional mink, raccoon, fox, or opossum. Under rigid protection, stocked beaver have multiplied so rapidly that an open season for trapping them recently has been declared. Since 1926, according to the Pennsylvania Board of Game Commissioners, the value of the raw furs taken annually in Pennsylvania has averaged $1,200,000.

Neighbors

III



Harvesting grass for silage

MECHANIZED FARMS

THE MOST outstanding development in agricultural practice during the century from 1840 to 1940 was the substitution of mechanical power for man and horse power, and the introduction of labor-saving machinery. The mechanization of farms began about 1905 and increased slowly until 1925, after which it proceeded at a greatly accelerated rate. The introduction of the twine binder about 1880 and the light general-purpose tractor about 1925 were epoch-making events in Pennsylvania agriculture. The American farmer is of a mechanical turn of mind and quickly adapted himself to his new role as agricultural engineer. So completely has Pennsylvania agriculture become mechanized that it is not uncommon to find farms on which the value of the equipment nearly equals that of the land.

Man, Ox, and Horse Power

In 1840 farming, except plowing, harrowing, and hauling crops to the barn, still was done mainly or largely with man power. Most farmers reaped grain with the sickle or cradle, threshed it with the flail, mowed grass with the scythe, and raked hay, planted corn, and sowed grain and grass seed by hand. Speaking of this period, W. M. Jardine said: "Could the farmer of Pharaoh's time be suddenly re-incarnated and sat down in Grandfather's wheat field he could have gone to work with a familiar tool. Then, within a period of fifty years, we covered ground in methods of crop production where fifty centuries had left almost no mark of progress." The old hand implements of Pennsylvania agriculture may be seen in the museum of the Bucks County Historical Society, Doylestown, and in the Pennsylvania Farm Museum of Landis Valley, Lancaster County.

The seventy years from 1850 to 1910 may be designated as the animal-power period, in which most of the work on the farm hitherto performed with human labor was done with the ox and horse. This trend was accelerated by the labor shortage during the Civil War. Oxen predominated until after 1870.

The arguments against the horse as compared with the ox were marshaled by Nicholas Biddle: "All the theory is in favour of the ox. He costs little, works hard, eats little, and when we have done with him he is worth more than when we began—whereas a horse costs much, eats much, and when he dies is worth comparatively nothing . . . [The ox, however,] has a failing which, in this country, is more fatal than madness to a dog—he cannot 'go ahead'—and it seems a severe trial to our impatient American nature to creep behind an ox-plough, or to doze in an ox-cart . . . [The ox] is of no benefit to the farmer's family. We can neither make a visit with him, nor go to church with him, nor go to court with him."[1] Additional reasons for using these powerful but slow-moving and stupid beasts were that yokes and chains cost less than harness and that the more placid disposition of oxen better adapted them for use on rough land.

As fields were cleared of stumps and rocks, roads improved, and more produce was hauled to market, the horse began to displace the ox. This trend was accelerated by the introduction of improved horse-power farm machinery. By 1870 horses and mules had practically superseded oxen as draft animals except on rough farms. Even before 1870, horses were preferred for use with the grain drill, reaper, mower, hay rake, and cultivator. At a Farmers' Institute held in 1896 the question, "What is the cheapest power for use on the farm?" was answered by Secretary Edge of the State Board of Agriculture: "There is probably no cheaper form than that of a light tread power . . . The governor will prevent any excess of speed when the whole power of the animal is not necessary for the work in hand . . . For shelling corn, cutting hay or fodder, or for sawing wood, such a power will perform all that is required of it."[2]

After 1925 the light general-purpose tractor began to displace animal power. The horse, however, continued to be a major or supplemental source of power on most farms, especially those that were small or rough. Since a farmer can raise all his horse feed but must purchase fuel and oil for his tractor, the horse affords greater independence and, under some circumstances, greater economy.

The House Amish continued to use horse and mule power exclusively for field operations, as a matter of religious conviction. When appealed to during World War II by a representative of the federal government to use tractors so as to produce more food, their Bishop replied: "We can only point to our experience. Time and again members of the

House Amish have proved that a good horse and love of hard work can produce more food than the use of any of these worldly contraptions. We admit that the tractor gets the work done more quickly, but it tempts one to postpone what has to be done."[3] Yet the Plain People do not hesitate to use the most modern farm machinery of other types—mowers, reapers, combines, hayloaders! The Amish may own and operate tractors for use as belt power, but they may not use them in the field.

Some horse-power machinery was introduced before 1840, but most of it was developed during the half century following, especially between 1840 and 1860. By 1860 patents had been granted for the basic principles of most of the modern horse-drawn implements; later developments were mainly refinements in ease of handling, durability, and efficiency. Among the many horse-power machines developed or perfected since 1840 were the sulky plow, gang plow, spring tooth harrow, disk harrow, sulky cultivator, steel roller, pulverizer, cultipacker, potato planter, grain drill, twine binder, combine, corn husker, mower, dump hay rake, side delivery hay rake, hay fork, hay tedder, hay loader, hay bailer, and thresher; some of these had been used in a crude form before 1840.

Abundant resources of coal and iron made Pennsylvania a major point of manufacture of the new kinds of iron horse-drawn implements and machinery. The most important centers of manufacture were Pittsburgh, the Schuylkill Valley and Philadelphia, Waynesboro, and York. In 1860 The Globe Plow Works of Pittsburgh, established in 1825, made 125 plows a day; the Pittsburgh Agricultural Works, established in 1855, manufactured reapers, threshers, tread mills, and fodder cutters. Many farm implements continued to be made, also, in local blacksmith shops throughout the State.

The steel age began in 1856 when Henry Bessemer of England discovered the Bessemer process. It did not gain a foothold in America until 1870, when Andrew Carnegie established mills at Johnstown, Bethlehem, and Pittsburgh. Steel was as cheap as iron and greatly superior to it. Most of the output went into rails for the rapidly expanding railroads, but a considerable proportion was used in the manufacture of farm machinery.

Early users of farm machinery had great difficulty in determining the most efficient makes of machines. To meet this need there came into vogue about 1870 local, state, national, and international competitive exhibits and trials, the results of which were published in farm journals. These followed the pattern set by plowing matches of earlier years. After 1852 the machinery exhibits and trials at the annual State Fair held under the auspices of the State Agricultural Society attracted much attention. The Centennial Exposition at Philadelphia in 1876 was a great stimulus to the invention of improved farm machinery, as had been the World's Fairs in London in 1851 and in Paris in 1855.

Most farmers quickly adopted horse-drawn machinery; and the "good old times" of man labor passed into nostalgic reminiscence.

MECHANICAL POWER

The substitution of mechanical power for horse power, which began with the introduction of the gasoline tractor about 1905, did not make much headway in Pennsylvania until after 1925, when the light general-purpose tractor appeared. Thereafter it progressed rapidly, being stimulated by the feverish prosperity of agriculture that followed World War I. Soon implements designed specifically for use with tractors supplanted horse-drawn implements. New machinery and improvements on old machinery appeared rapidly, including gang plows, trucks, combines, corn harvesters, pick-up hay balers, mechanical planters, hay loaders, and many others. All over the State the implement sheds of farmers were enlarged to make room for new machinery. In some districts, however, especially in the glaciated parts of northern counties, there were serious obstacles to mechanization. In 1930, P. I. Wrigley wrote, "It is not uncommon for a farm [in Wyoming County] to have 15 or 20 fields, of two or four acres each, separated by broken down stone walls. [These] are a real obstacle to the adoption of modern machinery."[4] In recent years many of these walls have been removed with the bulldozer.

When first used the tractor was heavy, cumbersome, and costly. This gave an advantage to the large-acreage farms of the West. With the introduction of the small, light, general-purpose tractor and equipment designed for use with it, the eastern farm of forty to one hundred acres was no longer at a disadvantage in this respect.

During World War I steel was at a premium and war industries had priority on it, hence farm machinery was scarce and expensive. Manufacurers were directed by the federal government to save steel by making fewer varieties of implements. The manufacture of over 3,000 varieties of tillage implements was ordered discontinued.[5] The varieties of steel plows were reduced from 312 to 76; disk harrows, from 589 to 38; planters and drills, from 784 to 29.

Mechanization of Pennsylvania farms proceeded at a rapid pace during the flush twenties but was slowed up somewhat during the depression years of the thirties, when wages were low, feed for horses and mules cheap, and money scarce. After the war the price of farm machinery did not fall commensurate with the price of most other farm supplies and was far out of line with the price which the farmer received for his produce; hence there was no incentive for him to expand production. More than one local Grange, facing dwindling prices for farm products and continued high prices for farm machinery, reacted as did a Grange in Jefferson County, which "*Resolved,* That we farmers desist from buying any farm machinery until there is a substantial reduction in the prices."[7] But more prosperous times for the farmer were just around the corner.

A century ago there was much common ownership of machinery, especially for harvesting small grain, and cooperation among neighbors in its use—there had to be, because machinery was scarce and dollars few. Each neighbor might own a share in a thresher or reaper, or even some less expensive implement, using it in rotation. Since farm mechanization has become general, there has been a decided drift toward individual ownership of equipment. The custom thresher has given way, in many cases, to the one-or-two-farm threshing outfit. The custom grist mill has yielded to the farm feed grinder. In general, only specialized equipment, as power sprayers for use in potato spray rings, now is owned cooperatively by neighbors.

THE STEAM PLOW

The forerunner of the modern gasoline tractor was the "steam plow" or "steam farm horse." Pennsylvania pioneered in the development of this leviathan of the land. In 1856 a Pennsylvania farmer asserted, "Machinery is insufficient. Some new motive power is wanted . . . to move the mower, the rake, the spreader and the thresher; to drive the plow, the harrow, and the drill combined; and something to husk the corn."[8] Observing the ease with which steam engines pulled railroad trains, some inventive minds wondered if steam could not be used to pull plows also.

Joseph W. Fawkes, a mechanic of Lancaster County, designed the first steam plow that won popular acclaim. On August 17, 1853, the Philadelphia *Press* reported, "[He] has recently invented and patented a new steam plough, which is attracting considerable attention. A public trial of its merits took place at Christiana, on the 11th. inst., in the presence of about one thousand persons, with satisfactory results, the ploughing being as well executed as that usually done by horse power." [9] The United States Commissioner of Patents reported that a trial of steam ploughs had been made at the Illinois State Fair, Freeport, in September, 1859, at which Fawkes' steam plow impressed all spectators. It had been the winner of the gold medal at the United States Agricultural Society fair in 1859. It was awarded a premium of $3,000.[10]

The Fawkes steam plow was received with much enthusiasm in the prairie states, where large-scale farming and level land prevailed; it was far too cumbersome and costly to be practicable on the small and often hilly farms of Pennsylvania. Fawkes was feted throughout the West. A correspondent of the *Ohio Farmer* reported in 1859, "When Fawkes gives a couple of toots of his whistle and the great steam horse speeds over the ground dragging a gang of plows, almost every man, woman and child leave horses and sulkies to their fate and follow this blower-up of antiquated notions."[11]

Thus encouraged, Fawkes moved to Illinois, expecting to manufacture his steam-plow there, but the onset of the Civil War halted all activities in this direction. After the war there was renewed interest in steam plows. In 1871 a committee of the Philadelphia Society for Promoting Agriculture conducted a trial of Heydricks' steam plow, a field locomotive weighing about eight tons. It drew four plows at two and one half miles an hour whereas Fawkes' machine drew eight plows at four miles an hour and plowed four and three tenths acres an hour. The committee, however, was justifiably skeptical of the economy of the operation in Pennsylvania as compared with horse power; and also questioned whether the compacting of the soil by the eight-ton engine was not injurious.[12]

A track-laying steam plow was invented by Thomas S. Minniss of Meadville, Crawford County, about 1873. "When it was completed they took it out to Iowa for demonstration on large scale farming. The machine drew six plows, easily . . . . The experiment was entirely successful."[13] This machine never was manufactured commercially. Robert C. Parvin of Philadelphia invented a track-laying steam plow which he demonstrated at the Illinois State Fair in 1872. A company was formed to manufacture it at Farmington, Illinois, and a number were sold for use in the Mississippi Valley.

The Fawkes and other steam plows had many disadvantages. They required coal and a crew of two to four men. They were so heavy—six to eight tons—that they frequently bogged down in soft ground by their own weight. The cumbersome monsters required more power to move them than was delivered at the drawbar. There were few skilled mechanics to operate them and no repair shops were available. Their cost—$10,000 and up—was prohibitive to most farmers. The Williamson-Thompson "land locomotive" used in 1874 on the Landreth Seed farm near Philadelphia cost $15,000. It had "India rubber tyres." This was the first rubber-tired tractor in America. For these compelling reasons steam plows found practically no acceptance in Pennsylvania but were used considerably in the West, especially on the great wheat ranches of the San Joaquin Valley, California. The Geiser Steam Lift Plow, manufactured by the Geiser Manufacturing Company, Waynesboro, was one of the best and was used in the prairie states about 1882.

Meanwhile other kinds of steam engines for supplying power on the farm were coming into favor. At the State Fair of 1852 a premium of $25 was offered "For the best portable steam engine adapted for agricultural purposes." Various kinds of "Self-propelled Farm Engines" soon were on the market. In 1887 it was reported, "The use of steam power [traction and stationary engines] is becoming rapidly introduced throughout the State of Pennsylvania for threshing."[14] The Frick Implement Company of Waynesboro began to build steam plows in 1853 and pioneered in the manufacture of traction engines. For many years it sold about 1,800 annually. The A. B. Farquhar Company of New York also was active in this field.

In 1885 the General Assembly passed an act which required the drivers of traction engines to stop them by the roadside 300 feet from approaching horse driven vehicles and assist the horses to pass. In 1888 the Secretary of the State Board of Agriculture reported, "The introduction of steam for thrashing and the convenience of traction engines . . . for drawing the thrasher and for moving the machinery from farm to farm, has led to a frequent appearance of this kind of machinery on our public roads. In most cases it has been found difficult to drive farm horses past such engines."[15]

Two bottom tractor plow

THE TRACTOR

The machine that has been most instrumental in mechanizing Pennsylvania agriculture is the tractor, far more so than the reaper. Pennsylvania played an important part in the development of this epochal machine, even though it was slow to adopt power farming because of its small farms.

Little progress was made in gasoline tractor design until after 1900. The tractors of that day were unwieldy monsters, powerful but very expensive. Edward Notestine of Mifflin County is reputed to have been the first Pennsylvania farmer to use the gasoline tractor, in 1912.[16] It was fairly successful for plowing, harvesting grain, and hauling crops to the barn. It was of twenty horse-power, and weighed six tons. A few tractors were manufactured in this State; Fred Flinchbaugh of

York made tractors before 1910. The Frick Implement Company of Waynesboro pioneered in reducing weight and cost. Soon, however, tractor making passed into the hands of large manufacturers. World War I gave a decided impetus to the mechanization of farms as the demand for food pyramided.

Until after 1925 tractors were a comparative rarity on Pennsylvania farms; they were too cumbersome and too costly for all except those with large acreage and comparatively level land. They were far more serviceable on the great farms of the West, where farmers could hook up plows, harrows, and drills tandem to plow, harrow, and seed thirty acres of wheat a day in a single operation. They also were used to pull combines.

The light general-purpose tractor first became commercially available in this State in 1925.[17] It weighed about one ton and sold for around $500. Within a few years it became a primary source of power on many farms, not merely a supplement to horse power. An almost complete change in the design of farm implements followed, permitting them to be attached to the tractor as a single unit

The general-purpose tractor proved to be efficient on the small farms that characterize Pennsylvania agriculture. It made it possible to perform many farm operations, as seeding and cultivating, at much greater speed than with horse power and with greater timeliness. The power take-off, introduced in 1924, came into general use about 1930 and made tractor power available for spraying and other operations. Pneumatic tires were first used in 1934; they gave from twenty to thirty-five per cent more drawbar power, as compared with tractors equipped with steel lugs, as well as greater fuel economy and higher speed, and were more serviceable on soft ground. Previously there had been considerable difficulty when tractors and traction engines traveled over or crossed a macadam highway; the lugs cut up the road badly. The General Assembly passed a law requiring that the lugs be either removed or blocked out when these machines traveled on the highways. Sixty per cent of all tractors sold in 1938 had rubber tires.

The variety of operations that can be performed with the general-purpose tractor is remarkable; it is a veritable power plant. With it the farmer can plow, harrow, cultivate, plant corn, drill small grain, mow and rake grass, load hay, dig potatoes, harvest corn, haul crops to the barn, and do many other kinds of drawbar work. With the belt pulley the tractor is a mobile source of power for work previously done with a stationary engine, such as grinding grist, sawing wood, filling the silo, baling hay, shredding corn fodder. After 1935, tractors were equipped with lights so that they could be used at night. After rubber tires became standard, tractors were manufactured having higher speed, so that they could move crops, supplies, and equipment more expeditiously.

After 1920 the progress of farm mechanization was rapid. In 1916 there were only 540 tractors in the State. Viewing the uncertain results obtained with them, and their high cost, the State Secretary of Agriculture remarked, "The farm tractor, it is true, has come; but it is doubtful whether it will ever be as useful and economical as the horse upon the farm."[18] Labor shortage and high prices for farm products during World War I stimulated tractor purchases. In September, 1918, the State Department of Agriculture staged a tractor demonstration near Harrisburg; this did much to convince Pennsylvania farmers of their usefulness.[19] The wartime State Committee of Public Safety bought thirty-five tractors in 1918 and placed them in communities where sufficient custom work was assured to keep them in profitable operation. It was announced, "Before the State will send a tractor into a given locality there must be at least 120 acres to be plowed within a radius of eight miles. The price of plowing is $3.00 per acre."[20]

After 1920 the number of tractors increased rapidly; in that year there were 6,823. By 1925 there were 21,065;[21] in 1942 there were 59,180, or one for about every third farm.[22] By 1940 one fifth of Pennsylvania farms had tractors but no horses, one fourth had horses but no tractors, a third had both, and one quarter, mostly very small farms, had neither. With the more general use of tractors and electric motors there has been a corresponding reduction in the number of stationary gasoline engines on farms.

In 1940 Pennsylvania farmers still paid a tax on gasoline used in their tractors and stationary engines. This amounted to $3,000,000 a year. It was, in effect, a tax on food production from which farmers in most other states were exempt.

The mechanization of farms came about a century after a similar development had taken place in industry. The tractor has effected as profound changes in Pennsylvania agriculture as resulted when factory production superseded home industries. Thousands of acres that formerly were used to produce oats and hay as feed for horses were made available for other crops. Production costs were cut. The farmer became a mechanic as well as a tiller of the soil. The tractor, which in its early stages had tended to give an advantage to "big farming," now helps to perpetuate the small, family-size farm.

It is probable, nevertheless, that horses and mules will continue to provide much of the power on many Pennsylvania farms. They can be reared there and fed entirely on products of the farm, thus obviating the necessity of a cash outlay; the weight of this argument is most readily discerned during depression years. Moreover, there still are a few farm operations that can be done to better advantage with horses than with even the most flexible tractor. In general, however, the tractor and truck will continue to supplant the horse.

REAPERS AND THRESHERS

Next to the tractor, the machine that has had the most significant influence on Pennsylvania agriculture is the reaper. In 1840 most farmers still reaped grain with the sickle or cradle and threshed it with the flail. The chief limiting factor in wheat production was the available supply of harvest labor.

Obed Hussey, a descendant of Nathan Hussey, one of the commissioners who laid off York County in 1749, patented his reaper in 1833 and soon thereafter began to manufacture it in Baltimore. Cyrus H. McCormick of Rockbridge County, Virginia, patented his reaper in 1834. The Hussey machine was introduced into Pennsylvania in 1837.[23] The first trial of the McCormick reaper in this State was in 1840, on the farm of Frederick Watts, Cumberland County.[24] Neither machine found much favor until after 1855. In that year Conrad Moul of Hanover, York County, began to manufacture the Hussey reaper.[25] The Hussey machine was more widely used in Pennsylvania than the McCormick prior to 1860. In 1846 a Pennsylvania farmer purchased a small Hussey reaper for $100. He harvested "eighteen acres per day of thirteen working hours" and saved "twelve or fifteen dollars per day, for scythesmen's wages, besides their board."[26]

The McCormick reapers were first brought into Lancaster County in 1851.[27] In 1853 the Chester and Delaware Agricultural Society reported that the mowing machine "was partially tested during the late harvest (1853), and will, no doubt, grow in favor as its merits become better known."[28] At the fourth annual exhibition of the State Agricultural Society at Philadelphia in 1854 several types of the combined reaper and mower, in addition to those of McCormick and Hussey, were shown, including the Pennsylvania Reaper and Raker. Both of the original Hussey and McCormick reapers simply cut the grain; it had to be bound by hand.

In spite of the obvious advantages of the reaper, especially in saving man labor, some ultra-conservative farmers were slow to adopt it. Some farmers who bought reapers had to keep them under lock and key lest they be destroyed by irate laborers who contended that they would "take the bread out of the working man's mouth." By 1865, however, this opposition had mostly disappeared, and the reaper was standard equipment on farms having a considerable acreage of small grain. The high prices of farm products and the shortages of labor during and immediately after the Civil War helped bring about the more general adoption of the reaper and other labor-saving machinery.

The most ambitious field test of reapers prior to the Civil War was that at Syracuse, New York, in 1857. Thirty-seven makes of reapers and mowers were entered in competition. The trials lasted one week and were attended by 2,500 people from all parts of the country. The use of the reapers was given a decided impetus by the success of American machines in competition with European machines at the World's Fair at London in 1851 and at the Paris Exposition in 1855. At the latter, "An Algerian machine cut an acre in 72 minutes; an English machine in 66 minutes; and an American in 22 minutes."[29] By 1860 the reaper had begun to supplant the cradle all over Pennsylvania. For the first time in history farmers were able to harvest as much grain as they had land on which to sow it.

The laborious process of binding into sheaves grain cut by the reaper was performed at first by two or three men who stood upon a platform at the rear of the machine and bound it as fast as it came from the wheel. A self-binder reaper, using twine, was invented in 1850 but was not successful. A self-binder using wire was introduced in 1873 but was quickly superseded by an improved twine binder. With this, two men and a team could cut and shock ten acres a day. The introduction of the twine binder, about 1880, was an epochal event in American agriculture.

Efficient threshers were on the market a few decades ahead of reapers. "More than 700 years before the Christian era," said Frederick Watts in 1853, "Isaiah prophetically speaks of a threshing machine, 'Behold, I will make thee a new, sharp threshing instrument having teeth.' And yet this . . . was not realized until the nineteenth century; and then received with a doubting caution that well nigh dampened the experiment."[30] Threshing machines were in limited use in 1830 but were clumsy and rather inefficient. Two of the best were those developed by Pennock Brothers of Kennett Square, Chester County, in 1827 and by William FitzPatrick of Lancaster County in 1832. The first really effective thresher was that invented by J. I. Case of Racine, Illinois, in 1843. It consisted of a large box with spiked cylinders inside, through which the grain was run. It was operated by horse-power. Not until after 1850 was the flail abandoned except for the threshing of buckwheat. The change was stimulated by the results of comparative tests at the Paris Exposition in 1855: "Six men were set to threshing with flails at the same moment that the different machines commenced operations, and the following were the results of half an hour's work:

Six threshers with flails	60 liters of wheat
Belgium thresher	150 liters of wheat
French thresher	250 liters of wheat
English thresher	410 liters of wheat
American thresher	740 liters of wheat"[31]

The early threshers were powered by two to six horses working on a treadmill or attached to a sweep. After 1865 the steam engine began to replace horse-power, then custom threshing became more common. "This power is generally owned by individuals," said Frederick Watts in 1879, "who go from farm to farm and thresh the grain for an agreed price, varying from three to five cents per bushel for wheat and oats.[32] There were also many neighborhood cooperative threshing outfits. By 1900 threshers were available ranging in size from a two-horse-power machine having a capacity of 135 bushels a day to a steam-driven machine which threshed 600 to 1,000 bushels a day.

The early machines merely threshed out the grain; it still had to be separated from the chaff, either by hand winnowing or by running it through a "Dutch" fanning mill, which had been in use for more than a century. After 1860 separators were attached to threshers and the grain was screened and cleaned in one operation. The "Pitt" thresher which combined successfully threshing, separating, and winnowing, was a favorite in this State. It consisted of a spiked cylinder enclosed in a case and mounted on a wooden frame, and was horse powered. It threshed twenty to twenty-five bushels an hour and required four hands. About 1870 a number of threshers were manufactured in Pennsylvania; among these were the Frick, Farquhar, Doylestown, Chalfont, and Messenger. The development of the windsucker, about 1890, obviated the use of several men to take care of the straw.

The triumphant culmination—for the time being at least—in the evolution of grain-harvesting machinery was the invention, by E. Briggs and C. G. Carpenter, of the harvester-thresher, or combine, in 1836. The modern version of this machine makes short work of harvesting. Two men, perhaps three, take a combine into the field and in a few hours the cleaned and sacked grain is in the bin and the straw is in windrows ready to be loaded on the wagon with a hay-loader, gathered up with a pick-up baler, or spread over the ground to be plowed under. Thus the labor of grain harvest has been so lightened that one man can accomplish as much as twenty men did in the days of the cradle. There are, however, certain hazards. To be combined successfully the grain must be ripe and dry; it must stand seven to ten days longer than grain harvested with a reaper. Light showers or heavy dews necessitate a delay of several hours in starting the machine. But it is a tremendous time-saver.

The combine was used successfully in California for more than a half century before Pennsylvania farmers tried it. As operated on the great wheat ranches of central California, the ponderous machine was drawn by eighteen to twenty-four horses or by a heavy steam tractor; it harvested 100 acres a day. The combine did not cross the Rockies into the Corn Belt until 1910. There, in much smaller size, it was drawn first by horses, then by a gasoline tractor. The first Pennsylvania farmer to use a combine was Ralph Brinser of Elizabethtown, Lancaster County, in 1920.[33] With the introduction of the general-purpose tractor and combines of small size, they became more practicable for use in this State. In 1927 and 1928, thirty were sold in Pennsylvania.

By 1936 over 300 were in operation, harvesting an average of 200 acres each. Thereafter the number increased rapidly; in the six years, 1938-43, 2,200 were sold in this State.[34] Most combines are owned privately, but considerable custom work still is done.

TILLAGE IMPLEMENTS

By 1840 the transition from the wooden moldboard plow to the cast iron plow was complete. Plows still were made mostly by local blacksmiths, and in many patterns, but the industry was in the process of being transferred from blacksmith shops to factories. Two of these in Pittsburgh made 7,000 plows a year. Indicative of the prevailing manufacture of plows by local blacksmiths, in October, 1851, the Philadelphia Society for Promoting Agriculture sponsored a plowing match at Norristown "between counties in southeastern Pennsylvania. Each county participating shall be at liberty to select such plough or ploughs as it prefers. The ploughmen shall come from the respective counties between which the match is made."[35] At the second annual exhibition of the State Agricultural Society in 1852 most of the farming implements shown were plows, more than half of which were of the local make.

The most important step toward better plows after the invention of the Jethro Wood plow in 1819, was by John Deere of Grand Detour, Illinois, in 1837. His steel plow was so much superior to the cast iron plow in strength, scouring, and lessened draft that by 1860 it had largely displaced the cast iron plow in this State. Now it was possible to dispense with the boy wielding a paddle who kept the plow clean of clinging soil. The next advance in plow-making was by James Oliver of South Bend, Indiana. On November 14, 1868, he secured a patent for hardening cast iron mold-boards so as to make them wear and scour better. These "chilled iron" plows cut the soil cleanly and soon were popular in Pennsylvania.

The next forward step was the introduction of the riding sulky plow. This took the farmer out of the furrow and between the plow handles, and put him on a seat where he could manage the team and adjust the width and depth of the furrow by means of levers. Patent for a sulky plow was granted in 1844 but this particular design did not find favor. On February 9, 1864, W. F. Davenport and Robert Newton of Illinois patented a riding plow which greatly eased the labor of the husbandman. Soon a third wheel was added to lighten the draft. These were the most important fore-runners of the many kinds of plows, both walking and sulky, that are in use today.

In 1840 corn and other row crops were "plowed out" by turning several shallow furrows to kill weeds. A few farmers used a heavy, awkward wooden frame one-horse walking cultivator having five large cast iron teeth. In 1854 a Susquehanna County farmer reported, "The

Cultivator is becoming of great importance in the cultivation of corn, and ought to supersede the use of the plow entirely in the raising of that crop."[36] A two-horse straddle-row cultivator was patented in 1856 but did not meet favor. By 1860 several types of straddle-row cultivators were on trial.[37] In 1869 Jacob Mowrer of Lancaster County patented a two-row sulky cultivator which was widely used in this State. By 1890 an almost endless variety of cultivators, both walking and riding, were on the market. Multiple row cultivators came into use about 1930.

The spring-tooth harrow, which was first patented in serviceable form in 1869 by David L. Carver of Michigan, had largely replaced the ancient spike-tooth harrow for seed-bed preparation by 1887. The disk harrow, which was patented in 1892, is but one of the many other improved tillage implements that have appeared in more recent years.

OTHER EQUIPMENT

In 1840 haying was considered one of the most onerous jobs on the farm. Commenting on haying operations in 1840, a Lancaster County farmer said in 1861, "Who will forget the old style pitch-fork, with its roughly-hewn hickory handle . . . and its tines of half an inch in diameter—the whole weighing three times as much as the equally durable ones of the present days? . . . How vastly greater the amount of labor expended in putting the hay into the mow and stable! When we look back . . . we cannot but remember our aching back and blistered fingers, and how fervently thankful we were when the last load of hay was safely housed or stacked . . . [Now] hay-making and harvest are no longer formidable operations. . . . The labors of the farm are lessened, the onerous duties of the farmer's wife in preparing food for the large number of men formerly required to harvest the crops are dispensed with."[38]

Grass was cut mostly with the scythe until after 1850. The early development of the mower closely paralleled that of the reaper; the first reapers could be used as mowers, also. Of the seven machines on trial as mowers at the field test at Geneva, New York, in 1852, five were "mowers and reapers." The platform back of the cutterbar of the reaper could be removed, thus transforming the machine into a mower. Reaper-mowers were not satisfactory as mowers; they did not cut the grass close enough and the driver had to leave his seat at every turn to prevent tearing up the sod.

About 1820 Jeremiah Bailey of Chester County invented the first mower as distinct from the reaper-mower. It was exhibited at West Chester, "where the inventor will not hesitate engaging to cut one acre (as well as is common to do it with a hand scythe) in forty minutes.[39] This machine did not live up to expectations. Between 1840 and 1850 a number of other mowers were patented but none proved satisfactory.

All had a single drive wheel, rigid cutter-bar, and heavy side draft; when brought to a standstill in grass they could not start again without first backing in order to get up speed. Not until two-wheel machines with flexible cutter-bars were developed did mowers find favor with farmers. Among the most satisfactory of these were the Cyrus Wheeler (1854), Buckeye (1856), and Wood (1859). Pennock Brothers of Kennett Square developed a mower which was used considerably in the southeastern counties. Mowers reduced the cost of cutting grass to less than a third of what it cost to cut it with a scythe.

Revolving, horse-drawn, wooden-tooth hay rakes, or "flop-overs," were in common use about 1840. They were not mounted on wheels and were lifted to dump the hay, by a man walking behind them. Teeth projected from both sides of the headpiece; to dump it the handles were lifted slightly, thus causing the rake to revolve and drop the load without stopping the horse. Ten acres a day could be raked with this implement, as much as by four or five men with hand rakes. A particularly serviceable type made by Pennock Brothers of Kennett Square was used on many Pennsylvania farms long after sulky dump rakes were on the market.

The steel-tooth riding rake which could be tripped at intervals to leave the hay in windrows appeared about 1860 but did not displace the revolving wooden rake for many years thereafter. Side-delivery rakes were first used in this State about 1900; they were convenient for use with mechanical hay loaders, which entered the hay field about the same time. With these it was possible to load a ton of hay on a moving wagon or truck in five minutes. Tedders for hastening the curing of hay were in common use by 1870. The pick-up hay baler was a more recent introduction; it picked up from windrows and baled about two and a half tons of hay or straw an hour. The buck rake, which carried half a ton of hay and obviated the necessity of loading it on a wagon, was used considerably in 1940. Thus American mechanical ingenuity has transformed hay making, which was one of the most laborous operations on the farm a century ago, into a comparativly simple mechanical operation.

Prior to 1840, small grain and grass were broadcast by hand and harrowed in. The first patent on a multiple-row seed drill was on a device developed by Pennsylvania's outstanding farm machinery inventors, Moses and Samuel Pennock of Chester County; it was issued March 12, 1841. The seeding pipes were rigid and so could not be adjusted to control depth of seeding, hence this particular implement found little favor. Eight years later, however, on October 13, 1849, these ingenious brothers patented a greatly improved type of drill in which the seeding pipes could be raised or lowered at will. This "lever drill" seeded seven rows nine inches apart and about three inches deep.

It seeded ten to fifteen acres a day. The Pennock drill immediately became popular in southeastern Pennsylvania; only in the central and western counties did broadcasting continue to prevail. In 1843 a Dauphin County farmer reported, "Until within the last few years all [our] grain was sown broadcast, but now drills are generally used."[40] In 1852 a Wyoming Valley farmer observed, "Last year ushered in the use of the grain drill, which was found to be of great practical utility to the farmer."[41] By 1875 drills were in common use throughout the State. In addition to the Pennock, the Buckeye and Farmers' Friend were most popular.

Before 1840 practically every operation in corn culture was manual. Farmers dropped seed by hand and covered it with the hoe or plow. A few used hand planters with which two acres could be planted in a day of hard work. In 1839 D. S. Rockwell patented a corn planter which had some of the features of the modern planter, but it found no acceptance. Between 1850 and 1860 planters of various types were introduced. At the second annual exhibition of the State Agricultural Society in 1852 an award was made to William Redick of Fayette County "for the best corn planter . . . which plants two rows at once, and marks the ground so as to keep the hills in rows in all directions."[42] In 1853 a "new and improved Corn Planter, recently patented by S. & M. Pennock, of Kennett Square," was introduced.[43] This became very popular in the southeastern counties, as were most of the Pennock introductions. Its check-row device was a distinct advance. The Billings corn planter, introduced in 1856, dropped both seed and fertilizer, covered, and rolled them. These early horse-drawn machines planted six to ten acres a day.

In 1840 corn was harvested wholly by hand. In 1911 a mechanical corn picker was introduced; this was a heavy machine which missed many ears if they were over-ripe. Recent improvements have made it much more serviceable. The one-row corn picker harvested one-half acre per hour. Usually it was pulled by a tractor, together with a wagon into which the shucked ears poured, thus making this a one-man operation. In 1890 a combined shucking and fodder-shredding machine was patented, and in 1892 a corn binder. By 1900 corn shellers handling 2,500 bushels a day were on the market. The ensilage cutter and silage filler were later developments.

Many other ingenious machines now lighten the manual labor of farming, increase efficiency, and reduce the cost of production. Among these are the potato planter, potato digger, transplanter, manure spreader, fertilizer distributor, sprayer, duster, and milking machine, to mention but a few. Hand implements, also, have been vastly improved since 1840 in design, strength, and lightness. The evolution of farm machinery and implements since 1840 is one of the most amazing chapters in agricultural history.

DIVIDENDS FROM FARM MACHINERY

The cost of farm mechanization is high. About 1853 "the implements on a 200-acre Pennsylvania farm were sold at auction, and the clerk's account shows that they brought just $72. This was a good farm managed by an up-to-date farmer."[44] According to the United States census the value of the machinery and implements on Pennsylvania farms in 1850 averaged $115 to a farm or ninety-nine cents an acre.[45] The 1940 census revealed that the average was $763 to a farm or $21.17 an acre of crop land harvested. Only six other states had a higher valuation. On some Pennsylvania farms the investment in equipment is as great as that in land.

Farming is less drudgery now than in grandfather's day but it requires much more capital. The first cost of modern farm machinery is so high that it will not pay dividends except on good farms. The annual depreciation varies from five per cent on wagons to ten per cent on binders and other equipment, averaging seven per cent. The farmer must calculate carefully before buying an expensive machine whether he can use it enough hours a year to yield a dividend of profit.

The primary advantage of using improved machinery is economic—it saves time, lowers the cost of production, and does the work more efficiently. In dedicating the new agricultural building at The Pennsylvania State College on November 22, 1907, Dean Thomas F. Hunt said: "The very improvements in the processes of agriculture which it is the purpose of this agricultural institution to promote make relatively fewer people necessary on farms. What is needed is not necessarily more farmers, nor necessarily greater yields per acre, but more farm products per unit of labor." In 1840 each farm worker produced only enough food for himself and three others; in 1940 he produced enough for himself and fifteen others. This has been brought about not only by advance in agricultural technology but also by the use of more efficient machinery.

Power and labor represent from a quarter to a half of the cost of producing the major farm crops of Pennsylvania (corn 54 per cent; oats, 46 per cent; potatoes, 43 per cent; wheat, 29 per cent; hay, 26 per cent).[46] Mechanization is not equally time-saving on all crops; it effects the greatest saving on wheat and other small grains, corn, and potatoes; least on tobacco, fruits, and vegetables. These require many operations that necessitate the use of human judgment and so can be performed only by the human hand.

Economists have calculated the saving in man labor effected by the use of machinery as compared with hand methods. In 1904 A. L. Quaintance found this to amount to 94.5 per cent for wheat, 60.9 for corn, 81.3 for hay, and 65.1 for potatoes.[47] In 1946 W. E. Keepper and S. A. Dum recorded the time and cost of harvesting corn with the mechanical picker as compared with harvesting by hand: "Pennsylvania farmers harvested an average of 12.6 bushels, shelled corn basis, per hour . . . when the mechanical corn picker . . . was used, as compared with 3.2 and 2.4 bushels when ears were husked by hand from the standing stalk or from shocked fodder. In 1946, the cost of harvesting a bushel of corn by mechanical picker was approximately 12 cents as compared with about 29 cents when either of the two [hand] methods were used."[48] These figures are low. Using a mechanical corn sheller one man is able to do the work that formerly required 100 men. The side-delivery rake and hay loader effect a saving of man labor of about two hours per acre as compared with the use of the dump rake and loading by hand.

It might be supposed that by using labor-saving machinery the farmer of today would have more leisure than his grandfather had, but it is doubtful if this is true. He simply dispenses with the hired man and operates the machines himself. If anything, the tempo of life on the farm has quickened, not slackened. The farmer is busy keeping up with technological advance in his vocation, and his business contacts are much more numerous.

RURAL ELECTRIFICATION

"Modernization of Pennsylvania's 191,284 farms," stated the Pennsylvania Department of Agriculture in 1938, "has progressed to the point where 70,100 of them are equipped with electric power."[49] This point of vantage was reached only after many years of frustration and mainly through the efforts of farmers themselves.

From 1840 to 1890 mechanical power on the farm, aside from the traction engine for threshing, was limited to the windmill and the hydraulic ram, which were used mainly for pumping water. Stationary gasoline engines began to appear about 1890. By 1920 twenty-seven per cent of the farms had this facility; in several of the southeastern counties more than half of the farms were so equipped.[50] These engines were used mainly to saw wood, grind feed, and sometimes to charge dynamos for lighting the farm.

The first efficient dynamo for generating power from stream flow was invented by Charles F. Branch in 1877, in a competition sponsored by the Franklin Institute, Philadelphia. After 1890, it was used on farms, chiefly for lighting. In 1930 there were 10,000 private electric plants on Pennsylvania farms. Most farms, however, still were illuminated by the kerosene lamp and lantern.

Until after 1935 comparatively few farmers had access to electricity generated by public utilities. Miles Horst reports that on January 1, 1924, only 18,000 of the 190,000 farms had current. Most of these were located along existing lines so that there was little expense to the companies to hook them up. They were using current mainly for lighting the home and barns and for operating small appliances at a cost of $1.50 to $2.00 a month. When farmers living away from existing lines requested service, it meant building new lines, which the companies considered too costly.[51] The electric utilities were so indifferent to the needs of the farmer that in 1923 Governor Gifford Pinchot initiated a "Giant Power Survey" of the State to ascertain how electric power can be made available at lower cost, especially to the farmer. It was proposed to develop electric power at the coal mines and transmit it to all parts of the State; and to link all the electric utilities into one great producing and distributing system. In 1924 the Survey Board equipped a farm near Harrisburg with electrical appliances for household and farm use, comprising seventy different operations. This was opened for inspection, especially during Farm Show week, and greatly stimulated interest in rural electrification.

The plans of the Giant Power Survey were not consummated; nevertheless, the effort was not wholly unfruitful. The utilities began to show more concern about serving rural customers, and the Joint Committee on Rural Electrification was organized soon thereafter. Meanwhile the farmers in several counties, becoming impatient at the indifference of the public utilities to their needs, built electric lines themselves. The pioneer movement was launched by Loysburg Grange, Morrisons Cove, Blair County, in 1924. It constructed an extension serving several hundred farms on a capitalization of $20,000 and connected it with the Penn Central Light and Power Company, which supplied current at wholesale rates. Labor to build farm spur lines was supplied by the farmers concerned; the cash outlay to a farm seldom was over $125.[52]

The beginning of wider rural use of electric current was Order 28 of the Pennsylvania Public Service Commission, issued March 1, 1927. Order 27, issued January 1, 1926, was largely the result of representations made to the Commission by the State Council of Farm Organizations and the State Grange. The protests of farmers were supported by the Pennsylvania Federation of Labor. The order directed the public utilities to build rural extensions and supply farmers with current under certain conditions specified by the Commission. The utilities fought this order in the courts, arguing that even when farmers were within reach of a transmission line they did not use enough current to justify the expenditure. There was considerable justice in this contention at that time; so the order was rescinded.

An effort was then made to advance the interests of both farmers and utilities through cooperative action. This succeeded where directives had failed. Miles Horst reports that in August, 1926, the Pennsylvania Council of Farm Organizations requested the Pennsylvania Electric Association to appoint a committee to meet with a similar committee of farmers. These two groups worked out a mutually acceptable plan which was taken to the Public Service Commission and resulted in Order 28 (March 1, 1927). This order recognized the principle of a relation between the cost of an extension and its returns, and also recognized the right of rural consumers to contribute toward the cost of the extension. The Joint Committee on Rural Electrification was organized, consisting of nine men representing farmers and seven men representing the utilities. A full-time Executive Secretary was employed. He investigated complaints from farmers and made recommendations to the Committee. Under this arrangement, within three years 11,832 farms were connected with power lines as compared with 18,000 in all previous years.[53]

In 1936 the Public Service Commission announced that it would no longer cooperate with the Joint Committee on Rural Electrification. This action was taken in order to pave the way for the operations of the federal Rural Electrification Administration in this State. The last meeting of the Joint Committee was on December 22, 1936. It had a very creditable record of achievement. During the ten years 12,710 miles of electric line had been built, bringing current to 34,100 farms. In all the years previous to 1927 service had been rendered to only 19,800 farms.[54] The annual revenue guaranteed to the utilities from the operation of extension lines had been reduced from thirty-three and a half per cent of the cost of the line to eighteen per cent. With increased use of current by rural customers, it became possible to reduce the rate to the same amount per kilowatt charged urban customers. The Joint Committee on Rural Electrification was an outstanding example of fruitful cooperation between agriculture and industry and of farmer initiative in solving rural problems.

The Rural Electrification Administration of the federal government was organized in May, 1935. Its purpose was to make loans, not grants, to finance the construction of power and light lines in areas without such service, but only where repayment of the loan could be expected. The REA did not itself construct, own, or operate lines; it merely loaned money for construction and gave technical assistance. Every farm in the area was to be served, not merely a few selected farms. In 1937 the General Assembly passed an act authorizing the organization of rural electric cooperatives to take advantage of the federal program.

By June 30, 1939, after four years of operation, the REA had allotted $7,222,000 to thirteen rural electric cooperatives in Pennsylvania. The first was the Northwestern Rural Electrification Cooperative of Crawford and adjoining counties. The first pole of the 124 miles of line projected was set August 5, 1936. This cooperative was financed by the REA in the sum of $400,000 at three per cent interest, the principle to be amortized in twenty-five years. A cooperative could buy its current wholesale from a utility or produce it. Farmers were not required to sign contracts specifying the minimum use of current. Each cooperative elected officers to conduct its business.

The Public Utility Commission reported that on January 1, 1940, nearly two-thirds of the farms of the State were electrified. Of the 115,941 farms which received current, 93,348 were served by the electric utilities and 22,593 by rural electric cooperatives.[55] The average construction cost was $1,815 a mile or $249 a customer.

More than 200 uses were made of current on farms in 1940. Chief of these were:

Light. Illuminating the home, barn, and poultry houses.
Heat. Cooking, incubating and brooding poultry, heating water, sterilizing utensils.
Power. In the home—operating washing machine, vacuum cleaner, radio, clothes iron, churn, refrigerator, fans.
On the farm—pumping water, milking, grinding feed, sharpening tools, cooling milk, shelling corn, grading fruits and vegetables, charging electric fences.

After 1940 rural electric service was greatly expanded. By 1946 more than eighty per cent of Pennsylvania farms were electrified.[56] Only the Old Order Amish and the conservative branch of the Mennonites failed to utilize this facility which adds so much to the comfort and convenience of the farm home and promotes ease and economy in performing many necessary farm operations. "Because of the principle of non-conformity," says Walter M. Kollmorgen, "the Amish and the conservative Mennonites are forbidden [by their church] to have electric plants of their own or to obtain electricity from a power line for either power or light. Partly as a result of this regulation, small gasoline engines are found on nearly all the farms and are used for several purposes—to pump water, to run the washing machine, or to run the milking machine."[57]

BUILDINGS

The most conspicuous structure on most Pennsylvania farms is a large bank barn. This type of barn was introduced by early settlers from Germany and Switzerland. Much of the activity of the farm centers in this great bank barn, which is crammed with the harvests of a fat land. It has an overhang on the south side where cattle can bask in the sun or burrow in the mountainous straw stack for some bovine tid-bit. The barn yard usually has a stone foundation and often is surrounded by a stone wall; this is the manure pen.

In the old days the stable was in the basement of the barn. The floor above it was in constant use during the winter for threshing grain with flails; now it is used to store equipment and feed. Many Swisser barns that have housed the harvests of a century are eighty or more feet long, fifty to sixty feet wide, fifty feet high, and cost $10,000 or over. Some are built wholly of stone, except the overhang, but most of them are frame structures. Until about 1920 it was a common saying in the southeastern counties, "Any color is a good color to paint a barn so long as it is red," largely because it was the cheapest. That part of the country was known far and wide as "the land of the big red barns." Other popular colors were yellow and straw color.

John B. R. Dickey describes the several types of barns in Pennsylvania: "Since 1840 there have been four primary types of barn construction in the sections of the state settled by the four principal nationalities. In the extreme southeastern counties which were settled by English and Welsh Quakers, typically in Chester County, the 'Quaker Barn' is prevalent. The basement and sometimes the ends were of stone. The siding invariably was perpendicular and more commonly whitewashed than painted. There were no ornamental ventilators or louvers. Usually there was a large strawshed supported by masonry pillars, otherwise there was a wide overhang; these afforded cover for the manure and for livestock in the barnyard. This was the only section of the state where the 'double-decker' barn, with the drive floor six or eight feet above the mows, was common.

"In southeastern and central counties, settled primarily by Germans, the 'Dutch Barn' predominated. This had a narrow overhang as distinct from the wide overhang of Quaker barns, and rarely had a straw shed. Often the ends were brick or stone pierced by fancy louvers. Usually the siding was horizontal, painted and ornamented with 'hex signs' in geometric design or paintings of farm animals. There might be ventilators on the roof but these served no useful purpose. The Pennsylvania Germans took great pride in their barns and spared no pains in their construction and ornamentation; some cost the savings of a generation. The barns of the 'Plain People' followed the same general design but had less ornamentation. In the central counties a straw shed often was added, the siding was perpendicular, and there was less ornamentation, but the narrow overhang and general design were in practically universal use.

"West of the Allegheny Mountains where the settlers were chiefly Scotch-Irish, save in Somerset County, the 'Scotch-Irish Barn' prevailed. It was simple in design, utilitarian instead of ornamental. There was no overhang. Manure was stored inside the barn at the front; the stables were at the back. Since good lumber was readily available, stone was used only in the foundation. The siding was perpendicular and seldom was whitewashed or painted.

"In the northeastern counties, which were settled by people from New England, the 'Yankee Barn' prevailed. The hip roof was used in order to give more mow space for hay, this being primarily a hay rather than a grain district. Stone was used only for the foundation. The siding frequently was horizontal and, on the more prosperous farms, was painted. The stable arrangement was unique in that it usually ran the long way of the barn with two rows of stalls facing out. There was a door at each end so that a sled or spreader could be drawn through to remove manure. This largely eliminated the need for a barnyard."[58]

Changes in farming, particularly greater specialization and mechanization, have modified the number and type of farm buildings. The barn still dominates the farmstead, even overshadows the house, but a dozen or more other buildings cluster around it. Among these are one or more silos, a milk house, machinery storage, machinery repair shop, garage, corn crib, smokehouse, chicken houses, spray shed, and, in Lancaster County especially, one or more tobacco-curing sheds. The once-common carriage house and ice house are no longer needed. The spring-house, once indispensable, is gradually disappearing, being supplanted by mechanical refrigeration. To men whose heads have been whitened by the snows of many winters, the sight of an old-time spring-house brings nostalgic memories of long drafts of cold spring water on hot summer days, and rows of shining tin pans filled with milk set for the cream to rise.

In recent years many farmers, especially those who feed steers, have found it desirable to add to the bank barn a two-story straw shed. Straw is stored on the second floor, and the steers run loose beneath. The animals are kept well bedded and the accumulated manure is hauled directly to the field, thus avoiding the loss from leaching which occurs in the old-time open yards.

The great advance of dairying throughout the State has made it necessary to modify many old bank barns in order to meet dairy sanitation standards. In his fight against bovine tuberculosis about 1895, Dr. Leonard Pearson condemned the bank barn as unsanitary. He said, "It is excellently adapted to certain purposes, such as the storage of farm crops and occasionally the housing of a few animals, but its basement . . . is unsuited for dairy cows. . . . The most cheerless place on many a farm is the basement of the old barn—dark, damp and forbidding. The place is so dark that patches of manure on the udders, flanks, hips and sides [of the cows] are rarely seen. The ceiling and walls are covered with cobwebs and dirt. . . . Frequently the joints of the boards in the ceiling . . . are loose and every disturbance above is followed by a shower of dust and hayseed."[59]

In recent years the basements of some ancient bank barns have been made fairly satisfactory for dairy purposes by providing tight floors above, whitewashing the walls, and installing electric lights. A common change is to dispense with the overhang by building a wall flush with the outer edge and placing windows in it. Many Swisser barns are constructed of stone and cannot be remodeled except at considerable expense.

Tight bank barns, while conducive to cattle comfort and to economy of feed, are not favorable to tuberculosis control. In 1916, when the warfare against this disease was at its height, *Pennsylvania Farmer* reported that buyers were discriminating against dairy cows which graduated into the beef market from tight barns and, to some extent, against steers fed in them. This disadvantage, together with the inadequate lighting of the basement and the superfluity of mow space, has led some farmers to replace their bank barns, when destroyed by fire or no longer serviceable, with other structures that are more sanitary, better lighted, and better adapted to specialized farming. He would be a rash prophet who would predict that Swisser barns, which have reigned supreme in Pennsylvania for two centuries, eventually will give way to more specialized structures, but the drift seems to be in that direction as specialized farming more and more displaces general farming. In recent years many ingenious mechanical devices have lightened work in barns.

Farm buildings are particularly liable to destruction by fire, especially barns filled with new hay which may overheat. The hazard that used to accompany the use of lanterns in doing the chores has been removed, but the hazard of lightning still remains. In the early days old-line insurance companies discriminated against farm property, either refusing to take the risks at all or charging exorbitant rates. This forced farmers to organize mutual companies. In 1840 a Philadelphia journal reported, "Several [farmers' mutual fire insurance companies] are now in successful operation. A number of others are being formed on the same plan."[60] In 1909 Pennsylvania had more than 250 such organizations, many of which were sponsored by the Grange. They usually insured farm property in but one, sometimes two, counties; and one company rarely accepted a risk of more than $3,500 on one building.

One of the earliest Grange mutual fire insurance companies was the Briar Creek Farmers' Mutual Insurance Company of Columbia County, organized January 11, 1875. By 1800 it had $1,000,000 of insurance in force. Another was the Centre County Mutual Fire Insurance Company, which was incorporated February 2, 1877. In 1909 the Grange Fire Insurance Company of Troy, Pennsylvania, which then was representative of these organizations, had 1,800 policies in force aggregating $3,150,000. After 1900 old line companies began to write more policies on farm buildings, and the number of farmer mutuals declined. In 1923, there were twenty-three Grange Mutual Fire Insurance Companies, having policies in force aggregating over $100,000,000.[61]

"The Amish," says J. William Frey, "do not . . . carry insurance. They have an agreement among themselves that affords them ample protection against loss from property damage; if a man's barn burns down, for instance, he bears only one-fourth of the cost toward a new barn. His Amish neighbors voluntarily raise his new barn in a single day, and this communal effort is crowned with an elaborate feast."[62]

FENCES

No aspect of farming has been the subject of more controversy, often acrimonious, than fences. From 1840 until 1890, few subjects received more attention in the agricultural press and at meetings of farmers. The construction and upkeep of line fences has been a bone of contention between neighbors more than any other subject, not excepting politics. The disagreement usually arises from the unwillingness of one party to build or repair his share of the fence, but sometimes from difference of opinion as to the location of monuments or bench marks of the survey which have disappeared.

Until 1889 Pennsylvania operated under the fence law of 1700. This was based upon the theory that the purpose of fences was to keep the livestock of farmers, which then ran at large on the open range, from breaking in and damaging crops. About 1840, when the land was more generally in farms, it began to dawn upon farmers that conditions had reversed—that the purpose of fences was to confine the stock of a farmer, not to exclude the stock of his neighbor. Nearly half a century passed and much bitter debate, before this point of view was embodied in law. In 1887 the Secretary of the State Board of Agriculture said, "Repeated attempts have been made to repeal and reverse this act of 1700, but so far such efforts have met with defeat. . . . Other states have had . . . laws similar to this, but nearly all have long ago discarded them."[63]

In 1885 the General Assembly passed an act which authorized each county to vote on the repeal of the operation of the Act of 1700 in that county. This act was declared unconstitutional in 1888.[64] The fence law of 1700 finally was repealed in 1889; then the whole matter reverted to the common law which had existed prior to 1700. Under this, if a man's livestock damages the crops of his neighbor he is responsible, provided the neighbor has suitably fenced his farm. Under the common law the farmer erects fences to prevent his own livestock from straying, not to exclude the stock of his neighbor. This is the present policy.

In 1840 wood was the almost-universal fencing material, except in the northern counties. The worm, snake, or stake-and-rider fence was most common; it was easy to erect and repair but it was readily overturned, occupied much space, and harbored weeds and rodents. Post-and-rail fences were more economical in the use of land and did not harbor weeds, but were expensive. Cedar and chestnut posts lasted forty years, oak posts twelve years. Locust posts were much more durable than oak and chestnut posts were almost as durable as cedar. It was a great loss to farmers when the blight destroyed chestnut, beginning about 1908. In 1846 a Lancaster County farmer wrote: "The common worm fence, with stake and rider, is in almost general use in the interior of this state. . . . Such a fence on a farm of 100 acres, divided into fields of ten acres each, with a lane through the centre, will occupy about six acres of land. . . . The scarcity of rail timber, however, will make this kind of fence give way to something more neat and economical."[65] This occurred soon after; but even in 1940 there still were a surprising number of old worm fences in the central and northern counties. Replacement of the original cedar or chestnut rails was not possible then, and locust posts were scarce; these remnants of old-time farming probably will soon disappear.

In the southeastern counties, where the shortage of wood for fences became acute before 1840, there was much interest in "live fences"—hedges of thornapple, privet, and other species, as is still common practice in Europe. Between 1850 and 1880 the Osage Orange was highly recommended, especially by nurserymen, as the "best defensive hedge plant; it is also highly ornamental." Those who used it regretted their choice; it was viciously thorny, occupied much land, required much soil moisture, and took much time to keep within bounds. Including labor, it cost as much as or more than a post-and-rail fence. Most farmers did not keep it trimmed.

In glaciated portions of northern Pennsylvania, especially in those sections settled by emigrants from New England, stone fences prevailed until after 1900. These were laid up with arduous toil and great skill. One marvels at the prodigious amount of labor expended by our forefathers in erecting these enduring monuments to their devotion to the land. Often they were three feet thick and five feet high. Horseshoes were set into the great end rocks to hold the bars. Stone fences divided many farms into fields of three to ten acres. With the advent of mechanized farming came the necessity for larger fields; since 1900 many stone fences have been removed with the bulldozer.

Wire fence was used occasionally before 1840; a factory for making it was established near the falls of Schuylkill. It was so expensive that only well-to-do gentlemen farmers experimented with it. Not until after 1874, when the Glidden patent for barbed wire was granted, did wire begin to supplant wood for fencing in this State. By 1885 barbed wire fences were common in the southeastern counties. In that year the Solebury Farmers' Club of Bucks County resolved that "*Whereas,* Within the last decade, wire in its different forms has come largely into use for fencing purposes, very much lessening the expense without destroying the efficiency of the fence; *And Whereas,* Such fences made of wire are not lawful, and render the owner liable to damages that may occur from their use; therefore, *Resolved,* . . . to have prepared a law . . . legalizing wire fences, and to urge its passage by the Legislature."[66] This objective was accomplished indirectly in 1889, when the fence law of 1700 was repealed.

Approval of the barbed wire fence was by no means unanimous. In 1889 a Pennsylvania farmer protested, "Cattle and horses by crowding along the fences, as stock often does, are ripped open at their sides, and often get entangled in the wires and tear themselves to pieces in shocking manner.[67] In 1897 Governor Hastings vetoed an act making it lawful to erect along public highways or between adjoining properties a fence constructed in whole or in part of barbed wire. Woven wire fence without barbs was not used much until after 1890. Most of the light wire fencing sold prior to 1915 rusted out in six to ten years; the heavily galvanized fencing of recent years is much more durable.

The latest development in fencing is the electric fence. Patents for this were issued in 1886, but not until after 1930 did the invention become of practical importance. One strand of charged barbed wire is strung for cattle, and two for sheep or hogs. Animals that come into contact with the charged wire receive a light shock; after two or three such experiences they do not touch it again. The electric fence is cheap and effective. In 1940 it was considered useful as a temporary fence but was not recommended as a permanent fence or for use along highways, there being some danger to both livestock and humans unless the right kind of controller was used.

One reason why fences were such a controversial subject in early days was their expense. It was commonly recommended that farmers in southeastern Pennsylvania plant one or two acres with tree seedlings in order to provide fencing material.

At a meeting of the Concord Agricultural Society, Chester County, on September 24, 1869, "a member laid before it a statement of the number of panels of fence on a farm of ninety acres in this neighborhood, together with its probable cost in total and per acre yearly to keep it up. Posts are rated as worth thirty-five cents apiece, rails eighteen cents and the cost of setting post-fence as fifteen cents a panel. In the worm fence the putting up is counted as making the rails cost eighteen cents each. The statement is as follows:

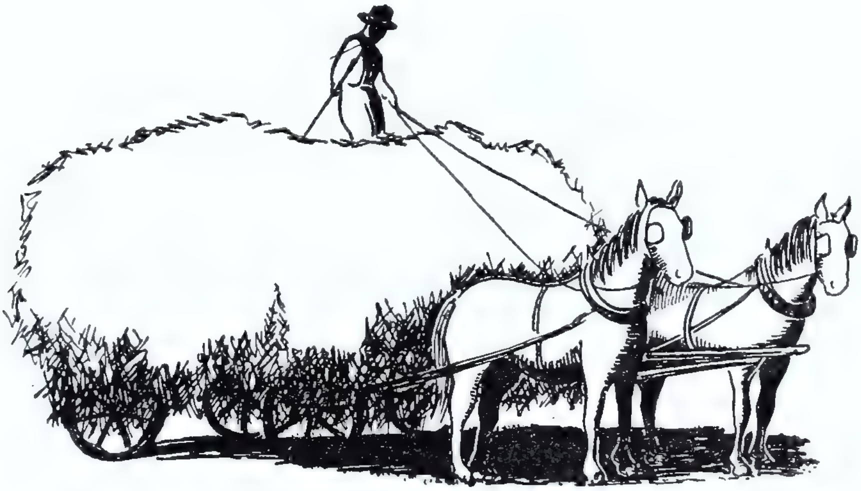
72 panels of 3-rail fence at $1.00	$72.00
710 panels of 4-rail fence at $1.30	923.00
1,924 panels of worm fence at $1.08	1,233.36
Total	$2,228.36

"Allowing that the fencing will last twenty-five years it would cost $222.83 per year, which is $2.48 per acre yearly. This raises the question, 'Will the coming farmer fence?' "[68]

In 1875 it was reported to the State Agricultural Society, "The proportion of each kind of fencing [in Pennsylvania] is the following: worm fence, 67 per cent.; post and rail fence, 17 per cent.; board fence, 12 per cent.; and all other kinds about 4 per cent."[69] In 1885 the Secretary of the State Board of Agriculture stated that the census for 1880 showed that the annual cost of maintaining the fences for a hundred acre farm in Pennsylvania was $1,124. In other words that "it annually costs one dollar to keep five dollars and seventy cents worth of livestock away from eight dollars and nine cents' worth of crops."[70] No wonder fences were a controversial subject in those days! Soon thereafter wire fencing became available and greatly reduced the expense.

The old-time rail fence has mostly passed from the contemporary scene, but there are many who recall it with affection. Among these is Edmund Cody Burnett, who says: "In the good old days when the rail fence reigned supreme, the farmer could take his secure and fairly comfortable seat on the top rail, smoke his corn-cob pipe and survey his farm, thoughtfully laying plans for the future. When a neighbor came over, as neighbors often did, the two would sit on the fence, whittle, smoke and hold unhurried discourse. . . . There never was a finer school for agricultural, civic and political training than the old rail fence."[71] Nowadays farmers cannot be even fairly comfortable sitting on their barbed wire or electric fence to smoke, whittle, or neighbor.

Fencing is no longer a major problem of the Pennsylvania farmer. Mechanized farming is most practicable when the fields are large. Since 1925 the fences which divided farms into fields of two to ten acres in horse power days have been gradually removed. Many farms now have only boundary fences; some do not even have these. With higher land valuations and more intensive farming, it becomes increasingly uneconomic to maintain the old-time fence rows which occupy much land and harbor weeds. In mechanized farming, the fewer fences the better.



Old time haying

IV

Cradling wheat

LABOR

CHANGES in farm labor during the century from 1840 to 1940 were fully as great as changes in the techniques of production and in the processes of marketing. By 1840 indentured labor had practically disappeared from farms, and there was no slave labor; only free labor remained. Much less man-labor now is required to operate farms than in 1840 because of the use of labor-saving machinery. A large proportion of it may be considered skilled labor. The operations of modern farming, especially the use of machinery, require a much more alert grade of labor than that which tilled the soil mainly with its brawn. With the development of highly commercialized agriculture and corresponding changes in the rural social structure, less of the work of the farm is done by the farmer's wife, sons, and daughters, and more by machinery.

LABOR CONDITIONS, 1840-1910

Prior to 1900 manual labor was so great an economic necessity that it was considered a social and moral virtue. This attitude was justified by the Biblical injunction, "In the sweat of thy face shalt thou eat bread." The prevailing glorification of labor was expressed in a poem by Frances D. Gage, which was widely quoted about 1850:

I love the plowman's whistle,
The reaper's cheerful song;
The drover's oft-repeated shout
As he spurs his stock along;
The bustle of the market man
As he hies himself to town;
The halloo from the treetop
As the ripened fruit comes down;
The sound of busy threshers
As they clean the ripened grain;
The huskers' care-free merriment
'Neath the moonlight on the plain;
The soft voice of the dairy maid,
The shepherd's gentle call;
These sounds of rural industry
I love, I love them all.[1]

Nowadays the poet might find the whirr and clank of farm machinery less romantic.

In 1840 most of the work on the farm, except at hay and small grain harvest, was done by the farmer and his family. Even relatively well-to-do farmers worked hard. "In harvest time and haying," said a correspondent of *Lancaster Farmer,* in 1869, ". . . the farmer and his hired-help generally rise at 4 o'clock in the morning, and retire at 8 o'clock in the evening. We could single out many of our principal farmers that are in very easy circumstances, owning two or three large farms, and who work with their hired hands all seasons of the year, and at all kinds of work, as though working for stipulated wages. We may safely venture the assertion that farmers in this county, as a general rule, work harder than they do perhaps in any other section of the whole Union. This is indeed the great secret of their success."[2] Frequently there was a "hired man" and occasionally a "hired girl"; these were employed by the year and lived in the home of the farmer, being practically members of the family.

From the time when they could walk, children were expected to contribute toward the operation of the farm and home. The small boy kept the kitchen wood-box filled. The small girl hunted eggs in the haymow and about the yard. From these simple tasks they graduated by degrees into the more important work of the farm and household. By the time they were ten or twelve they were performing much of the labor of adults.

Milking and the care of milk and its manufacture into butter or cheese were considered the responsibility of the distaff side of the family.

Additional help was needed at grain and and hay harvest, which then was carried on by hand. Neighbors exchanged services or day labor was employed, both men and women. Expert harvest hands, especially cradlers, commanded high wages. In 1850 they were paid seventy-five cents to one dollar a day, which was from sunrise to sunset; they could mow one and a quarter acres of grass or cradle two acres of wheat a day. The farmer's wife had the onerous task of providing big dinners for the harvest hands and threshers. She fairly outdid herself to heap the table with tempting dishes in great variety and equally great quantity. The hands, who had "slicked up" at the spring, did full justice to the spread; a fourteen-hour day of strenuous work gave them voracious appetites. In 1848 farm labor commanded "$8 to $12 per month by the year, with board; transient labor, 50 cents per day; harvesting, $1; female domestics, from $1 to $1.50 per week."[3]

A shortage of farm labor developed between 1850 and 1860; labor-saving machinery had not yet come into general use to ease the situation. Free labor was drained from the farms by emigration to the prairie states, railroad construction, the gold rush to California, and the growth of urban industries. Emigration fever ravaged the Pennsylvania countryside, especially the northern tier of counties; many thousands left the old home farms to found new homes in the West where the price of a day's labor in the East would buy an acre of rich prairie land. In some communities it seemed as though everybody was "going West."

The demand for labor to build railroads, which then were creeping across the "great American desert," was very heavy; in 1857 it was estimated that they had withdrawn 400,000 men from other employment. Between 1850 and 1860, disturbed economic, political, and religious conditions in western Europe resulted in a flood of immigration to America, two and a half millions from Ireland alone. Few of these new citizens came to rural Pennsylvania; most of them found employment in coal mines and in railroad construction camps, or passed through the State to take up farms in the West. Farm wages advanced sharply; good cradlers were paid $1.50 to $2.00 a day; mowers, $1.00 to $1.50. Wages by the year were commonly $150 to $200.

The outbreak of the Civil War in 1861 greatly aggravated the labor shortage. "Even before the volunteer quota was called for, . . . there was a scarcity of farm hands . . .," said the editor of *Farmer and Gardener* in 1862. "The withdrawal of nearly a hundred and eighty thousand able-bodied men from our state, is a subject for most serious thought. . . . We see but a single remedy, *labor-saving machinery*. . . . Those who have used the flail must secure the thresher; the scythe must everywhere give way to the reaper. The horse-power must do the work of the men."[4]

As in other wars, farmers suffered in competition for labor with war industries. In 1863 a farm journal editor commented, "Complaints of the scarcity of laborers in all the manufacturing departments reach us daily. . . . The great abundance of money, the readiness with which workmen of all classes find employment in manufacturing establishments, have only added to the difficulties which farmers will shortly experience."[5] Farm wages rose to $2.00 or more a day. This period of stress continued for several years after the close of the war.

Necessity is, indeed, the mother of invention. The exigencies of the situation stimulated the development of new labor-saving machinery. They also spurred farmers to utilize machinery, already available, which their conservatism had led them to ignore previously. The reaper and the thresher became established on Pennsylvania farms during this period. It has been asserted that the issue of the Civil War was decided by the invention of the reaper.

In many parts of rural Pennsylvania three-fourths of the able-bodied men either volunteered for the armed forces or were drafted. On many a farm where the husband and older boys had gone off to war, the wife and mother, with the help of the younger children, valiantly carried on as farm hands. There was heroism on the farms as well as on the battlefields.

With the collapse of fictitious war-time prosperity about 1870, farm labor became more plentiful and the prevailing wage lower. In 1880 the State Board of Agriculture reported that the average was seventy-one cents a day, with board, the estimated cost of which was thirty cents a day.[6] The average wage by the year, with board, was $12 a month. Harvest hands averaged $1.00 a day with board. The farmer's wife was able to secure a woman to help in the house and dairy for $1.55 a week and board. This was at a time when wheat was bringing seventy-five cents to a dollar a bushel; potatoes, forty to fifty cents a bushel; and butter, seven to twenty cents a pound.

During the next two decades the price of labor advanced somewhat. By 1900 the average wage was eighty-five cents a day with board, the estimated cost of which was thirty-five cents.[7] The average recompense for yearly employees was $13.58 a month with board. Harvest hands averaged $1.35 a day with board. Household help could be had for $2.04 a week with board. The country was in a prolonged depression; the fires of industry were banked. Many "tramps," victims of the depression, applied to farm homes for an opportunity to earn a meal.

After 1900 the economic pendulum swung the other way, taking with it farm wages as well as farm prices. Labor shortage again became acute. In 1902 John Hamilton, State Secretary of Agriculture, summed up the situation: "The wonderful development of the manufacturing, mining, commercial and transportation industries, has drained the country of help until, in some localities, it is impossible to hire labor at any price which the farmer can afford to pay. More women have been working in the fields this year, than perhaps ever before in the history of the State."[8] By 1907, irregular day labor on farms averaged $1.10 with board. At that time it was estimated that seventy per cent of farm labor in Pennsylvania was hired with board supplied. The average wage by the year, without board, was $315. Harvest hands received $1.75 a day and board. The State Department of Agriculture reported, "During the year, there were some instances where the owners of good farms gave up all farm operations on account of the serious trouble experienced in securing suitable help."[9]

The seriousness of the problem was further indicated by statistics of the United States census, which showed that between 1900 and 1910 there was a fifty per cent increase ($8,431,000) in the amount expended by Pennsylvania farmers for labor, from $16,648,000 in 1900 to $25,079,000 in 1910.[10] During this period an average of 250,000 immigrants classed as farmers or farm laborers were admitted to the United States annually, but few of them struck roots into the soil. Thus Pennsylvania entered the period of World War I with a farm economy already under severe strain with respect to labor.

WORLD WAR I

Although the United States did not enter this war in a military sense until 1917, it was involved in the gigantic struggle in an economic sense after 1914, when the European belligerents unsheathed the sword. European industries were largely disrupted by the conflict; hence there was a heavy demand upon this country for the exportation of arms, munitions, manufactured goods, and food, primarily wheat. Prices of farm products and farm wages soared. It became increasingly difficult to get any farm help at all—the opportunities for employment in war industries were far more attractive financially.

After the declaration of war on the Central Powers by America, the labor situation, already difficult, became chaotic. Although the federal government gave much publicity to the slogan, "Food will win the war," and urged farmers to produce more food as a patriotic duty, especially wheat and meat, it was amazingly short-sighted with respect to that which was most necessary to achieve this goal—an adequate supply of farm labor. On many farms less rather than more food was produced because they had been stripped of labor. To the heavy loss of men for work in war industries was added the loss through volunteer enlistment or through the operation of selective service. In September, 1917, *Pennsylvania Farmer* reported that "at the beginning of this year . . . farm labor [in Pennsylvania] was only 64 per cent of the normal and the percentage is now down around 25."[11]

The experience of a Juniata County farmer is typical: "The draft of last fall [1917] practically stripped this section of Pennsylvania of skilled farm labor. In some cases men who worked rented farms and owned stock were taken. . . . We had just started to harvest the corn when my brother was sent to Camp Meade on twenty-four hours' notice, although he had applied for deferred classification. I worked away alone [on my 125 acre farm] until winter came, but I did not succeed in getting the corn all away. I have been trying since last November to hire some one to help me, but without avail. If I cannot get help I will be compelled to sell off some of my stock and farm less acres. I am only one of many farmers in this section who are in the same boat."[12]

The Selective Service Act, which went into effect in the spring of 1917, applied to all able-bodied men between the ages of eighteen and forty-six. It specifically provided deferred classification for "necessary skilled farm labor in necessary agricultural enterprises." A skilled farm laborer was defined as one who is "especially fitted for the work in which he is engaged." The difficulty was in the varied interpretation of the act by local draft boards and district appeal boards, which had complete autonomy in the matter of exemptions. Being under obligation to meet their quota of men, these boards often were forced to determine their selections by expediency rather than by law. The draft board of Lackawanna County, for example, inducted forty-five per cent of the farm youth under its jurisdiction; many other boards, less than half this percentage. Not until the war was nearly over (October, 1918) did the State Department of Agriculture appoint men to act as agricultural advisors to district draft boards concerning local farm labor requirements.

Farmers did not ask for special consideration as compared with other groups of citizens. They felt, however, that the government was making it impossible to meet what had been announced as a major wartime objective. It seemed to them inconsistent that a son who was working in a war industry at high wages was not drafted while his brother who had remained on the farm was.

As the war wore on, more consideration was given by governmental agencies to the critical labor situation on farms. In September, 1917, the Federal Board of Farm Organizations, which then represented the Pennsylvania State Grange in national affairs, presented a memorial to President Woodrow Wilson setting forth that unless the farm labor situation could be improved the nation would be "faced with the greatest scarcity of foodstuffs ever experienced in America."[13] Belatedly the federal authorities realized that they were draining the farms of labor. District draft boards were requested to give more sympathetic consideration to deferred classification of those who were unquestionably necessary to maximum food production. Beginning in April, 1918, many enlisted men still in this country were furloughed to help on the home farm at times when the work there was most pressing, especially at planting and harvest.

During the war more men and women left Pennsylvania farms to work in munition plants, ship-building yards, and other war industries than volunteered for the armed services or were drafted. Deferred classification was practically assured for such workers, and wages were high—perhaps eight to twelve dollars a day of eight hours. Some farmers who were located near war industries took jobs in them, leaving their farms to be worked by neighbors on shares; or they continued to handle them in part-time farming. In March, 1918, it was asserted that "the state efforts to get farm labor have been almost fruitless in the face of the demands for shipbuilding hands and of munition plants."[14] Any attempt to appraise the service of farmers and their families in war industries as compared with working on the farm would be fruitless, since motive must be considered as well as need. It is beyond question that those who forsook the farm to work in war industries profited much more financially than those who stayed on the farm; they also were much more secure from the draft. However, the work they did contributed to the effective prosecution of the war.

Most farm labor is skilled labor, the product of training and experience. It could not be expected that urban youths could take the place of farm boys. Such replacements could not counterbalance the production loss caused by the diversion of skilled farm labor to war activities. Pennsylvania agriculture was able to compensate for this more by harder work and longer hours on the part of the farmer and his family and by the more general use of labor-saving machinery than by the use of non-farm labor. Nevertheless, this emergency help was serviceable in many cases.

Non-farm labor was made available to farmers in several ways. The State Committee on Public Safety, State Department and Industry, and the Farm Labor Committee of the State Food Administration all made valiant efforts to secure adult urban help for farms, especially at harvest time, but with only moderate success; work in the war industries was more attractive. The main source of war-time emergency farm labor was high school boys not of draft age, mostly from sixteen to eighteen years. The State Department of Public Instruction helped to mobilize these youths. In 1918 more than 100 camps for training them were established in various parts of the State. The training period occupied but two weeks.

A large percentage of urban high school boys rendered satisfactory service on farms; some did not. Of 349 placed on Mercer County farms during the summer of 1918, only twenty-two were sent home. In most cases they were paid $1.00 a day by the farmer. Sometimes the boys lived in a camp of twenty-four or more in charge of a qualified leader and went out to work on different farms as requested; others were assigned to certain farmers for the summer and lived with them. Many public schools, especially in rural districts, closed earlier in the spring and opened later in the fall than usual; the time was made up by eliminating or reducing holidays and keeping school in session six days a week.

Urban women and girls, fired by a patriotic desire to contribute toward the war effort, volunteered for farm work in large numbers. For the most part these blue-overalled "farmerettes" gave satisfactory service; what they lacked in efficiency was partly made up in willingness. They devoted their vacations to work on the farm, particularly to the care and harvesting of vegetables, instead of to recreation. In 1918 the "Women's Land Army" had twenty-two units comprising 1,100 women in Chester, Allegheny, and Erie counties.

Various public agencies and civic bodies, especially the Agricultural Extension Service of The Pennsylvania State College and city chambers of commerce, made important contributions. In 1918 the Chamber of Commerce of Wilkes-Barre, in cooperation with the Agricultural Extension office of Luzerne County, undertook to supply the farmers of that county with emergency labor. It reported, "Farmers made 1,649 requests for help, which was supplied in every case. One day 450 business men went out to harvest crops, another day 300, another day 250, and quite a number devoted one day a week to work in the fields. Rev. Kasaczun, a Polish priest, enrolled 3,500 foreign women to work on farms. These assembled at their churches every morning, where the automobiles of members of the Chamber of Commerce called for them and took them to the country, bringing them home again at night. . . . Over 1,200 boys were enlisted and worked faithfully."[15] These public spirited people worked without recompense. The splendid cooperation between town and country folks developed during war time was the beginning of much closer rural-urban relationships in the years that followed.

Some Pennsylvania farmers were "conscientious objectors"; they were averse to participation in war, even to working in war industries, as a matter of religious conviction. Most of these were members of the Mennonite, Amish, and Dunkard churches; some were Friends. For the duration of the war they were excused from military service but were placed in camps from which they were sent out to work on farms at the standard wage.

LABOR CONDITIONS, 1918-1940

The close of the war, in 1918, brought little relief to hard-pressed farmers. Many who had left farms to serve in the armed forces or in war industries did not return to them; they had acquired new interests. The industries did not collapse at once; the greatly inflated economy of the nation continued to soar—for a time. In the spring of 1920 Frederik Rasmussen, State Secretary of Agriculture, reported that a survey revealed that almost 90,000 Pennsylvania farms were short of hands, more than at any time during the war. Three fourths of the farms of Delaware County were under-manned and half the farms of Lancaster, Berks, and York counties. Only the most prosperous farmers could afford to employ labor.[16]

In June, 1920, Governor William Sproul appealed to urban people, especially to college and high school students, to work on farms that summer. So serious was the situation that in 1923 the General Assembly appointed an interim committee of its members to study agricultural conditions in the State, with particular reference to the scarcity of farm labor. This committee held hearings around the State, but nothing constructive resulted.

In 1925, a Chester County farmer stated, "[Chester County farmers] are paying 400 per cent more for help than they did twenty-five years ago . . . During the present harvest season farmers are paying $3.50 a day with dinner and supper included and in some cases $4 a day and that for a ten-hour day as compared to the longer days of a quarter of a century ago. . . . Twenty-five years ago in this section 75 cents a day was the regular rate . . . and at harvest time an additiontal 25 cents was paid . . . A more serious situation, however, prevails to-day . . . in the household . . . Twenty-five years ago many of the farmers' wives had help paid at the rate of two to three dollars per week. This help would assist with the milking in the morning and evening, do household chores and spend evenings in sewing and mending."[17]

The "Great Depression," from 1929 to 1938, brought a surfeit of farm labor, and a sharp slump in the prevailing wage. This is reflected in statistics gathered by the Pennsylvania Department of Agriculture:[18]

	Per Month Without Board	*Per Day Without Board*	*Supply as Percentage of Demand*
April 1, 1928	$57.25	$3.15	113
January 1, 1933	32.00	1.55	200
January 1, 1940	40.50	2.15	109

During the years 1930-1937, when the depression was at its height, many unemployed city men appeared at farmhouse doors seeking work. In 1934 a farmer reported, "In our section every year sees a larger number of men and big boys working for their board in the country. [Farmers] are able to get fair help simply for a comfortable room and board. Some of the helpers are farm trained."[19] Soon thereafter the Public Works Administration program, the Civilian Conservation Corps, and other governmental relief activities absorbed many unemployed, and farmers found it more difficult to secure labor. On September 1, 1935, the Federal-State Crop Reporting Service reported that the supply of farm labor was the lowest since 1929 and that many farmers were urgently in need of help. Ironically, there were 1,500,000 people on government dole in the State at that time, many of them in rural communities!

Following the upswing in the industrial life of the nation, beginning about 1938, labor became increasingly difficult to secure and the prevailing wage rose rapidly. Soon thereafter the United States was caught up in the maelstrom of World War II and the chaotic labor conditions that had prevailed during World War I were experienced again.

FAMILY LABOR

There was relatively less family labor on the farm in 1940 than a half century earlier, partly because work by women and children was less practicable in a machine age than when most of the work was done by hand; but mainly because families were smaller and because children spent much more time in school. The boys and girls of an earlier day attended school only three or four months a year until they were twelve, and only in winter, when farm work was slack; practically their entire time was available to work on the farm. By 1940 school attendance was compulsory for nine months of the year up to the age of eighteen unless a permit of withdrawal to work on the farm was secured at the age of fourteen or fifteen. Most rural youth now attend high school, and many go to college.

In 1848 the General Assembly passed an act forbidding the employment of children under twelve in textile factories. The child labor act of 1915 prohibits the employment for compensation of children under fourteen years of age who have not reached the sixth grade, but it does not apply to children at work on the farm or in domestic service. From time to time attempts have been made to include farm children under the provisions of this act; but such efforts have not won universal favor. "No child-labor laws," says Cornelius Weygandt, "can take away from Plain Clothes children the delight of farm work. They love to lead or ride the beasts harrowing or cultivating, bring the cows in from pasture, . . . feed the hens, drive off crows. They play hard, too, but work is necessary to their happiness."[20] This could hardly be said of the average non-Amish farm boy—he would rather go fishing.

It is the custom of many Pennsylvania German farmers, particularly Plain People, to withdraw their children from school at the minimum age when a "working certificate" for farm or household work may be secured. This is at the age of fourteen or fifteen. In predominantly German counties, from fifteen to thirty per cent of all pupils of these ages were withdrawn from school in 1937; whereas in predominantly English or Scotch-Irish counties, less than one per cent. The percentage of farm youth attending high school in 1930 ranged from sixty-seven per cent in Tioga County to thirty-three per cent in Berks County.

Farm women and children devote far less time to work on the farm than they did a half century ago. Only in time of emergency, as at harvest, do they work in the fields. Never, even in manual farming of colonial days, did the farm women of Pennsylvania even remotely approach the condition of the peasant women of continental Europe in this respect. As reported by an American in 1896, "Not far from Bonn [Germany] I was surprised . . . to behold a woman and a cow harnessed together patiently . . pulling a light spike harrow over the ground which was then in garden-like condition, both being driven . . . by a creature . . . called a man. . . . The unmarried eldest daughter in France is the plowman by virtue of her position . . . It is safe to say that five times as many women as men are the competitors of American farm laborers throughout Europe . . . It is estimated that women and dogs harnessed together do more hauling of goods in Germany than the railroads and all other methods of conveyance put together."[21]

Until after 1900 dairying was "women's work." In 1901 a qualified observer stated, "The 'Pennsylvania Dutchman,' whatever his virtues may be, has a terrible aversion to milking a cow. He looks upon it as a disgrace to his manhood, and all the milking done in this section of Pennsylvania [York and adjacent counties] for many years was done by the female portion of the family."[22] With the greatly increased mechanization that followed World War I there was a marked decline in the participation of farm women in the labor of the farm, even in dairying; and there was an even greater decline in the number of women employed as farm hands. The war opened to women many less laborious occupations hitherto reserved exclusively for men. Many farm women, however, especially those of German descent, still work considerably in the fields.

Cooperation among farmers, particularly in the use of specialized machinery, continues to be an important factor in the farm labor situation. The first cooperative potato spray ring in this State was organized at Germania, Potter County, in 1919. By 1928 there were 165 of these rings, covering 935 farms. Cooperative use of potato planters and diggers also was common. These operations were on a business basis; informal cooperation, arising from a spirit of neighborliness, was far more common. In 1928 the *Pennsylvania Grange News* reported that members of the Shartlesville Grange and others had gathered at the home of Joseph E. Naftzinger, unable to work because of a paralytic stroke, and in three hours husked his corn and hauled in a large part of it. This is typical of the friendly helpfulness of rural people.

SMALLER FAMILIES

One reason why a much smaller proportion of the work on Pennsylvania farms was done by the farmers' families in 1940 than in 1840 is that fewer children remain on the farm. As the industrial revolution gathered headway, farmers made valiant but futile attempts to stem the flow of youth from the farms to the cities. In 1880 it was reported that as means of keeping boys and girls on the farm, "a society of Chester county has hit upon a good plan. This year one hundred dollars in gold was offered as premiums to boys who raised the largest crop of corn on an eighth of an acre; and valuable premiums were offered to girls for the making of the best bread and the best butter . . . The parents tell us there has been no time when their children were so much interested in farming pursuits as this year."[23] These programs were forerunners of the 4-H and Future Farmers clubs of today.

"It is not so many years ago," said the editor of *Pennsylvania Farmer* in 1925, "that almost every program for a farmers' meeting had a subject such as, 'How to Keep the Boys and Girls on the Farm' . . . Farming methods have been so improved that a far less proportion of the population is required to furnish the food for the whole. What chance for profitable farming would there be today if the farmers of twenty-five years ago had found a solution to their question of how to keep the young people on the farm?"[24] Since 1840 farms have been a great population reservoir which is drawn upon whenever better opportunity for employment is available in other fields. From this source alone do cities grow. According to M. E. John, "Pennsylvania's population is not reproducing itself . . . The replacement index for the State in 1940 was 93.6. An index of 100 means that the population is neither increasing nor decreasing. The urban replacement ratio was 79, rural non-farm 123 and rural farm 139."[25] The United States Census of 1935 revealed that the average size of urban families in Pennsylvania was 3.34; farm families, 4.01. Fifty years earlier the average size of farm families was 6.5 members.

By 1900 the declining birthrate, especially in the cities, had become a major social problem of the nation. However, although farm families are much smaller than they were fifty years ago, rural people are reproducing their kind at a rate fully as great as that required to maintain the present farm population. The primary reason for the decline in the rural birthrate is economic—large families on the farm are no longer profitable finanically, as they were before the advent of power machinery. The much higher standard of living today and the much longer period of schooling make children more costly. Since large families are no longer profitable and are hence undesirable, they have become unfashionable, in spite of the denunciation of "race suicide" by President Theodore Roosevelt.

The economics of the farm family have been discussed by O. E. Baker on the presumption that "it costs $2,000 (at pre-depression prices) to rear and educate the average child on American farms to the age of 15, when he may be assumed to be self-supporting—and $150 a year does not seem an excessive estimate of the cost of food, clothing, medical service, education, and all incidental expenses with $50 a year allowed for the labor of the child from 10 to 15 years of age."[26] His allowance for child labor is very low.

Although under present conditions children on the farm are an economic liability rather than an economic asset, there are compensations which cannot be measured in dollars and cents. Children make the farm a home instead of merely a business enterprise. They give incentive to labor and meaning to life. The farmer has the hope that at least one of his sons will carry on from where he leaves off, building a home on the land for successive generations that bear his name. This kind of farm "labor" is the bulwark of the American democratic way of life.

One virile group of Pennsylvania farmers has continued to till the soil and to raise a quiver-full of children, as did their forefathers. The Amish still live under the "old order." Taking literally the Biblical injunction, "Be fruitful, and multiply, and replenish the earth," the Old Order Amish continue to have large families, often six children, sometimes ten or more. They withdraw their children from public school at the age of fourteen or fifteen; the boys then become full-time workers on the farm and the girls in the home. Since the Amish use most of the modern labor-saving farm machinery except the tractor, they are seldom without an adequate supply of farm labor.

HIRED LABOR

After 1900, the "hired man," who was employed by the year and lived with the family, gradually passed from the rural scene. He moved out of his employer's home into a home of his own and worked by the month or by the day. With mechanization, farming has become more capitalistic; there is a constantly widening social cleavage between the farm owner and his employees. This is a significant change. Until about 1900, farmers usually identified themselves with the working class; they worked in the fields as long hours and fully as hard as any of their hands. Now farmers have developed an employer consciousness. They are proprietors of a business, not merely tillers of the soil.

Seasonal or "tramp" labor is a comparatively recent development in this State. There are increasing numbers of migrant laborers, largely foreign-born, who drift over the country, following the season from south to north. They live in rude camps while harvesting crops, particularly on "factory farms." Comparatively little of this class of labor is used in Pennsylvania except on a few large truck and fruit farms and for harvesting canning crops.

Farmers are not liable for damages under the state Workmen's Compensation Act of June 3, 1915. This exemption is based on the ground that farmers are themselves laborers as well as employers of labor and that a large proportion of the work of the farm is done by the family. They are liable, however, as they always have been, under the common law; an injured farm worker or domestic can bring suit for damages; hence prudent farmers protect themselves by taking out casualty insurance to cover all their employees. In 1935 less then ten per cent of farm owners carried casualty insurance. Neither is farm labor covered in the federal social security program under which a percentage of the wages is collected to be used for unemployment compensation and old age insurance. However, certain types of agriculture which have an industrial aspect, as chicken hatcheries and "dairying when not incident to general farm activity," come within the provisions of these acts.

From time to time organized industrial labor has sought to unionize farmers and farm labor. Pennsylvania farmers have met this proposal with coolness, if not hostility. At a meeting of the State Grange in December, 1917, a committee was appointed to meet with a similar committee of the Pennsylvania Federation of Labor.[27] The program recommended by the joint committee failed to commend itself to farmers generally, however.

In 1921 Samuel Gompers, President of the American Federation of Labor, advocated a close alliance between organized labor and organized agriculture. Commenting on this suggestion, the editor of *National Stockman and Farmer* said, "Mr. Gompers' remarks . . . are stuff and nonsense . . . Agriculture has no sympathy with the closed shop, the artificial wage, the arbitrary working rules, or any other pet scheme of labor to restrict or hamper production or enhance its cost."[28]

In October, 1938, an attempt was made by Pennsylvania leaders of the Committee for Industrial Organization to unionize Pennsylvania farmers at a meeting in Harrisburg.[29] The labor leaders held out the inducement that the full strength of organized labor would be used in the General Assembly to secure legislation in the interest of agriculture. This argument failed to impress the farmers. In 1938 it was reported, "Only a few months ago a Pennsylvania farmer went to the officers of the law in his county and notified them that he was carrying two sawed-off shotguns on his truck to protect him from the interference of over-zealous representatives of organized labor."[30] In 1939 farmers of Somerset County who desired to work on the construction of the superhighway were told that they could not unless they were members of a labor union.

Rural hostility toward labor unions springs from their constant agitation for shorter hours and higher pay, which inevitably result in reduced production and higher prices. Farmers are accustomed to work long hours. They strive for economical production and are impatient with idleness. Moreover, many of them are employers of labor. For these reasons the interests of farmers and of organized industrial labor are not compatible. Some of the migrant labor that comes into the State to help harvest certain crops is unionized, but the farmers themselves and practically all their employees are not. Only in the food processing industries, as in creameries, had unionization made any headway by 1940.

One of the many complications that might accompany the unionization of farmers was indicated by a newspaper in the anthracite coal district in 1920: "The organized coal miners demand that everything they buy shall be produced by union labor. As a result, farmers who sell produce in some mining towns are being asked to show their union cards."

HOURS OF WORK

Poor Richard's maxim, "Early to bed and early to rise," is observed by most farmers. Walter Kollmorgen describes the daily summer routine of the Amish: "All members of the family except the smallest children arise between 4 and 5 o'clock in the morning. Milking and other chores require from one to two hours . . . Between 5:30 and 6 o'clock, breakfast is served . . . Shortly after 6 o'clock the day's operations are begun . . . Work in the barns or fields continues until eleven o'clock, which is dinner time. If the weather is not too disagreeably hot, field work is resumed shortly after 12 o'clock . . . Supper on the Amish farm is served between 4 and 5 o'clock . . . Chores come immediately after supper. During the rush season, one or several men may again work in the field after supper until dark. Between 8:30 and 9 o'clock, most of these people go to bed."[31]

This work schedule is, perhaps, somewhat more strenuous than that followed on most non-Amish farms, but nowhere is there an "eight-hour day." In 1840 President Van Buren declared ten hours a legal day's work on government projects, and private industry was not slow to follow this lead. In 1847 the General Assembly established ten hours as a legal day's work in certain industries. By 1924 the eight-hour day had become established as part of the "American standard of living" in industry. On farms, however, labor continues to work ten or more hours, according to urgency. In 1927 a survey of the State revealed, "The estimated average length of day required of hired farm labor is 10 hours in the spring, 10 hours 40 minutes in summer, 9 hours 40 minutes in fall and 8 hours 40 minutes in winter."[32]

In recent years farmers have been subjected to the inconvenience of "daylight saving"—setting the clock forward one hour during the summer months. This device of adjusting the hours of daylight for urban convenience, so that a longer period may be available for recreation, was adopted during World War I. On August 19, 1919, after the close of the war, Congress passed over President Woodrow Wilson's veto a bill to repeal the daylight-saving law. It then became the responsibility of each state or political subdivision thereof to determine whether or not daylight saving should be continued locally. Some municipalities continued it, others did not. This resulted in much confusion. In 1923, under strong pressure from farmers, the Legislature amended the act of 1887 which established Eastern Standard Time throughout this State by adding, "provided, That no county, city, borough, town, township, or other municipal subdivision of the Commonwealth shall, by ordinance, resolution, or rule adopt a different standard of time for any year, or any portion of the year, than that herein provided." This action seemed to settle the issue.

Some municipalities, however, immediately began to evade the law. On the strength of an opinion from the Attorney General of the State that municipalities could "fix their own time provided no ordinance is passed," the governing bodies of Philadelphia, Pittsburgh, and other cities began to "recommend" to their citizens that they turn clocks ahead one hour on a certain date and back one hour on another date. By 1930, more than sixty municipalities comprising about forty per cent of the population of the State had "recommendatory daylight saving," and by 1940 it was general.

Eventually farmers were forced to conform, although their objections to daylight saving were valid. They did not mind getting up an hour earlier—they rose before daybreak anyhow—but they did object to the loss of time, especially at hay and grain harvest. Time was lost in the morning, since the dew should be off the standing hay or grain before it is cut; and at the end of the day the hired help quit an hour earlier. The confusion incident to the observance of standard time in some localities and by the railroads and "fast time" in other localities was a great inconvenience. Most farmers felt as did a correspondent of *Pennsylvania Farmer*: "This morning I went to my clock and looked with shame upon its honest, patient face that has religiously recorded time for five generations. I turned the hands one hour ahead. An hour later Old Sol came up through the tree tops to smile upon this world of silly vanities of which so-called daylight saving, or counterfeit time, is one of the silliest."

Economy in the use of labor, whether family or hired, is promoted when the work is distributed fairly evenly throughout the year. This depends on the enterprises on the farm; it is more possible with some, as dairying and poultry raising, than with others, as fruit and potato growing. In 1848, when Chester and Delaware counties were the chief center of beef production in the country, it was said, "The system of farming [in Delaware County] requires nearly a uniform amount of labor throughout nine months of the year, equal to that of two active men and a boy to each 100 acres of cleared land at a cost [of] $400 [a year], or $4 per acre."[33] In 1927 the Pennsylvania Department of Agriculture reported, "The amount of farm work done each month [on Pennsylvania farms] is estimated to be 2.3 per cent in January, 2.4 in February, 4.3 in March, 8.8 in April, 11.6 in May, 12.1 in June, 14.5 in July, 12.4 in August, 11.7 in September, 10.1 in October, 6.7 in November and 3.1 in December."[34]

This factual statement discredits the remarks of Henry Ford in 1924, as reported by *Pennsylvania Grange News:* "If a man's time is worth any more than that of a setting hen, then the farm is no place for him to work through the whole year. There is not enough for him to do that is worth doing. He spends from half a month to a month a year getting ready to start Nature into production and in harvesting what Nature has produced. During the remainder of the year he is taken up with footless tasks which keep him occupied but do not gain him a living."[35] Henry Ford was a great industrialist, but obviously he did not know much about farming.

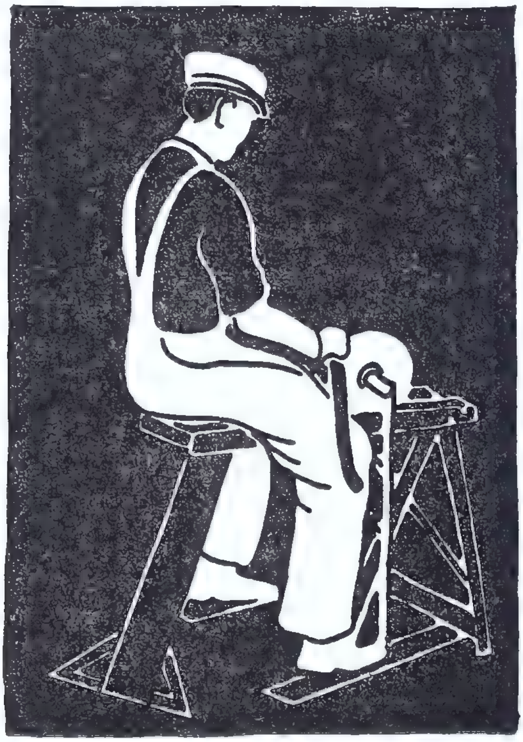
As illustrative of the fact that profitable farming is a year-around occupation, not merely a part-time job, the seasonal round of labor on a Lancaster County farm may be cited:

Spring	Prepare tobacco seed beds, sell steers, plow and fit land, plant corn, set tobacco plants, plant potatoes.
Summer	Cultivate corn, potatoes, and tobacco, top and sucker tobacco, spray potatoes, harvest hay and wheat.
Autumn	Dig potatoes, harvest corn, cut and cure tobacco, prepare land for wheat, purchase feeder steers.
Winter	Feed steers, strip and market tobacco, haul manure.

If dairying or poultry is one of the farm enterprises, as is usually the case, these require labor throughout the year.

Cost accounts records show that labor normally is about thirty-six per cent of the total cost of producing the crops most commonly grown in Pennsylvania and forty-two per cent of the total cost of producing livestock. Man-labor hours required to an acre range from twenty for oats to one hundred and two for potatoes.

Nearly one third of the working hours of Pennsylvania farmers is devoted to the care of dairy cattle. Chore time—feeding, watering, cleaning the barn, milking—comes regularly twice a day, every day of the year, Sundays and holidays included. A study of the labor requirements on Pennsylvania farms made in 1933 revealed: "Man labor was the most significant item for [producting] livestock. It required about 160 man hours to care for one dairy cow or 100 head of poultry."[36]

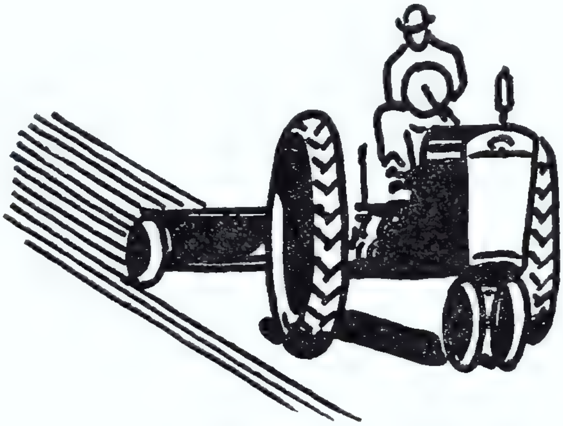


Grinding the axe

V

SOIL FERTILITY

WITH FEW exceptions, Pennsylvania soils are not high in native fertility. After the first few years of lush production from new ground, crop yields declined rapidly. By 1840 many farms were producing less than half of what they did when first brought under the plow. As the organic matter in the soil was depleted, erosion began to take a heavy toll of soil fertility (Chapter I). Some farmers, however, used soil-building rotations and applied liberal dressings of manure and lime; the crop-producing power to such farms increased with the years.



Liming a pasture

From Guano to Chemicals

Modern fertilizer practice began in 1843 with the publication by Justus von Liebig of *Organic Chemistry in Its Applications to Agriculture and Physiology.* He showed that plants utilize certain minerals from the soil, as phosphorus and potassium, as well as carbon-dioxide from the air. He also showed that by treating ground bones with sulphuric acid a quickly available form of phosphoric acid could be obtained as superphosphate of lime. Liebig's "mineral theory" of plant nutrition was the foundation of the modern fertilizer industry.

Nearly half a century passed before chemical fertilizers became firmly established in the confidence of farmers. In 1864 Thomas H. Burrowes listed the "manures" then commonly used in the State:

"Animal manure" is stable and other *offal, guano, ground bones, &c. Vegetable* consists of clover and other green or dry crops ploughed down, also ashes. *Mineral,* is *lime, plaster of Paris* (gypsum,) or *soil* . . . "[1] Of these, animal manures were used most freely, lime next. In 1848 a Delaware County farmer reported that manure was the chief fertilizing material used in this section. "Bone dust has been applied to some extent with satisfactory results. Guano has also been extensively experimented upon; its immediate effects are highly satisfactory . . . but . . . the present high price . . . will probably preclude its general use."[2]

In 1854 the recently organized State Board of Agriculture summarized the situation: "About the only manures or fertilizers used are barnyard manure and lime. There is also considerable land plaster used and some experiments have been made with guano." Guano was a dried animal manure from South America, not a fertilizer; it was first used in Pennsylvania about 1843. In spite of its high price, guano was used quite freely until 1860, when it was superseded by superphosphates.

Prior to the introduction of commercial fertilizers, the application of lime or of land plaster was standard practice. "Barn yard manure and lime are our principal dependence," said an Allegheny County farmer in 1855, "although guano, bone-dust, and gypsum have lately been tried . . . The cheapest way to improve land in this and the adjoining county, is by the use of lime."[3] From 1800 to 1850 gypsum, or land plaster, was a close competitor of lime as a "fertilizer," but by the middle of the century the superiority of lime as a soil amendment had been fully established. Moreover, lime was cheaper, since limestone rock could be quarried and burned on many farms.

The more general use of commercial fertilizers, beginning about 1860, brought about a marked decrease in the use of lime. Between 1870 and 1900 the comparative value of lime and superphosphate was hotly debated at farmers' meetings and in farm papers. Many farmers discontinued the use of lime entirely and relied wholly on superphosphate; others continued to apply manure and lime, as had their fathers, to the exclusion of commercial fertilizers. Not until after 1900 did liming again become general throughout the State.

Beginning in 1843, Sir John B. Lawes and J. H. Gilbert established the efficacy of chemical fertilizers on their famous experimental farm at Rothamsted, England. There was strong prejudice then against "artificial" fertilizers in Pennsylvania, and they were not used in any considerable quantity until a quarter century later. The early commercial fertilizers were mostly superphosphates made by treating bone meal with sulphuric acid. In 1867 sixteen barrels of South Carolina rock phosphate were shipped to Philadelphia and there made into superphosphate.[4] About 1870, mixed or complete fertilizers, purporting to contain all of what were then considered to be the "essential" plant foods—nitrogen, phosphoric acid, and potash—began to appear on the market. Some were grossly fraudulent, being adulterated with dried muck, charcoal, soil, and other inert matter. The appraisal of "patent fertilizer" by a Cumberland Valley farmer about 1877 is typical: "Commercial fertilizers have been tested in the Cumberland Valley and found wanting. They are costly, uncertain and temporary in their effect."[5]

In order to protect themselves against what had become an outrageous fraud, in 1879 farmers secured the passage of a law regulating the sale of commercial fertilizers. The State Board of Agriculture was designated as the enforcement agency. The Board employed a chemist who analyzed samples of fertilizers sold in the State and prosecuted frauds. Thus was born the regulatory function now vested in the State Department of Agriculture and exercised in many other directions.

For many years the "chemical deficiency" theory of soil fertility advanced by Liebig dominated farm practice in the maintenance of soil fertility. It was assumed that if the soil was supplied with a sufficient quantity of the essential plant foods it would be productive. After a generation of the use of commercial fertilizers, however, it was found that these alone were not sufficient; that a favorable soil structure —what the old-time farmer called "good heart"—is fully as important as building up the level of plant food content.

The practice of securing a favorable soil structure by applying manure or by plowing under sods or green manuring crops had been followed by some farmers for many years. In 1842 a Selinsgrove, Snyder County, farmer reported: "The practice of turning over heavy growths of clover is gaining very rapidly in Middle Pa., and its advantages to the farmer are very apparent."[6] The particularly beneficial effect of turning under leguminous crops had been observed by farmers for several generations, but the scientific explanation of this fact was not known until 1886, when Hellriegel showed the relation of legumes to the fixation of free nitrogen in the air through the action of bacteria in the nodules on their roots. Since 1900 farmers have been as much concerned about maintaining a favorable physical condition of the soil—humus content, drainage, aeration, biological life—as about its plant food content.

About 1910 a soil scientist in the United States Department of Agriculture advanced the theory that the fertility of all naturally productive soils that are protected from erosion is inexhaustible; that the function of fertilizers and manures is to neutralize "soil poisons" excreted by the roots of crops. This theory, while having some basis in fact, has been generally discredited as an explanation of the primary effect of fertilizers on soils and crops.

It now is recognized that the maintenance of soil fertility involves far more than the addition of plant food. It includes the prevention of soil erosion, cultural practices (as crop rotations and tillage operations), drainage, type of farming, the care and use of manures, the maintenance of the organic content of the soil, and liming, as well as applications of commercial fertilizers; these are used only to supplement those farm practices which tend to conserve soil fertility.

CULTURAL PRACTICES

Previous to 1800 it was common to crop new ground in corn or wheat continuously or until the land rebelled, as indicated by diminished yields. On rich river-bottom land this soil robbery was practiced for many years with seeming impunity. In 1853 a Potter County farmer related, "One field was pointed out to me on the Sinnamahoning, that had been successfully planted with corn for 13 successive years, without any manure, and the yield of the last year was 25 or 30 bushels to the acre."[7] After 1800 it became more generally recognized that a rotation of crops is desirable, particularly one that includes a sod to be turned under which helps to maintain soil fertility by adding organic matter. The most common crop rotation of Pennsylvania—corn, oats, wheat, and grass—came into general use about 1790.

As general farming began to give way to specialized farming, about 1840, this "Pennsylvania rotation" was modified by the substitution of one crop for another. The principles involved in the Pennsylvania rotation, however, usually have been maintained; these are (1) a cultivated crop, (2) followed by a spring grain, (3) this by a winter grain, and (4) one or more years of sod. In the warmer parts of the State the cultivated crop almost invariably is corn for grain; in the cooler sections corn for silage or potatoes. In the northern, central, and western counties the spring grain is oats; in the warmer southeastern counties oats may be replaced by corn for silage, potatoes, tobacco, soy beans, or canning crops; or may be omitted, making a three- or four-year rotation of corn, wheat, and hay, wheat being seeded on corn stubble. In recent years winter barley often is substituted for wheat in the southeast. The grass mixture is seeded with winter grain in the southeast and with oats in the north and west; it is commonly timothy and red clover, sometimes alfalfa.

The northern counties, which have long winters and soils that are suitable for grass, began to abandon wheat about 1840 and to give more attention to livestock farming, at first beef cattle, hogs, and sheep, later dairy cows; and to devote a much larger proportion of the cleared land to hay and permanent pasture. A common rotation in the northeastern dairy section is corn for silage, oats, and two to four years of hay. In addition to these modifications of the Pennsylvania rotation, there are many short rotations for special crops. A popular rotation in Lehigh County is potatoes, followed by wheat, with which is seeded grass or alfalfa, this to be plowed under the following year for potatoes again. More commonly, however, this becomes a three-year rotation of wheat, hay or alfalfa, and potatoes. The value of all rotations in building soil fertility is measured mainly by the amount of organic matter that is added to the soil by plowing under sod or other vegetative material.

The ancient practice of fallowing or "resting" land, which prevailed during early colonial days, has long since passed, although there still are a few deeply religious farmers who fallow their fields every seventh year, as directed by the law of Moses: "Six years shalt thou sow thy field . . . and gather the fruit thereof; but the seventh year shall be a Sabbath of rest unto the land." The modern philosophy of maintaining soil fertility is to keep the land busy producing crops, provided some are soil-building, as grass and clover, not soil-depleting, as corn.

In 1733 Jethro Tull, a progressive English farmer, reported his experiments on tillage in *Horse-Hoeing Husbandry*. Between 1840 and 1850 Tull's work was much quoted in Pennsylvania. Many farmers began to cultivate the soil more thoroughly, some believing, as Tull had suggested, that tillage alone would make sufficient plant food available for crops through aeration of the soil. Tull and his followers were over-sanguine in this respect. Farmers who had been led to believe in the efficacy of tillage as a means of conserving soil moisture through the maintenance of a soil mulch to check evaporation from the soil surface were skeptical when scientists discovered that the soil mulch has practically no value for this purpose except as it kills weeds. "The chief function of intertillage," said the Pennsylvania Agricultural Experiment Station, "is to kill weeds, not to conserve soil moisture through the action of a soil mulch. . . . Nothing is gained by cultivating more frequently than is necessary to effect a complete control of weeds."[8]

Prior to 1840 deep plowing and subsoiling as a means of increasing the pasturage of roots and hence the productive power of the soil were championed by a few. They thought that crop yields would be proportionate to the area loosened by the plow. In 1845, J. Dungan told the Bucks County Agricultural Society, "Many farms in this county have been seriously injured by deep ploughing. One of the vice-presidents of this Society, whose large and well managed farm is perhaps unrivalled in fertility, testifies that his land cannot be beneficially ploughed more than four inches deep."[9] Although subsoiling was not generally beneficial and was used only under special conditions, deep plowing (without turning up much of the subsoil) eventually became established as one of the most practical means of enhancing the productive power of soils. It not only increased its water-holding capacity, but also provided wider feeding area for crop roots.

Under-drainage of wet land is another means of increasing its crop-producing power. Such land is more common in the northern and western counties than in the southeast. In 1855 an Allegheny County farmer reported his experience: "Farmers here are turning their attention to draining their wet lands, and they find that nothing they can do will pay better. . . . We dig the drains from 2½ to 3 feet deep; then fill them up with cobble-stones, which abound on most farms, to within 12 or 15 inches of the surface. We then put a layer of any kind of straw over the stones, and cover and fill up with the excavated clay."[10] Since 1870 most under-drainage has been with tile.

Laying tile drains

About 1912 a catchy phrase devised by commercial interests, "farming with dynamite," was added to the farmers' vocabulary. Manufacturers of dynamite highly recommended its use as a means of increasing the productive capacity of certain soils, particularly those having a "hardpan," or layer of soil quite impervious to water, close to the surface. It was recommended that small charges of dynamite, regularly spaced, be exploded to shatter the hardpan especially in planting fruit trees. It soon was discovered that "farming with dynamite" seldom is necessary or profitable, except in extreme cases of hardpan. Most farmers have come to believe, with Pope,

. . . ."If vain our toil,
We ought to blame the culture, not the soil."

—*An Essay on Man,* Epistle IV.

TYPES OF FARMING

About 1850, when Pennsylvania farmers were forced by competition from the West to abandon the all-grain farming that had prevailed since early colonial days and turn to livestock, especially the dairy cow, they did so very reluctantly. Nevertheless, this was the highway to greater prosperity, primarily because this type of farming conserves the fertility of the soil by providing more manure and more sod; whereas all-grain farming is soil robbery. H. P. Armsby, first Director of the Pennsylvania Agricultural Experiment Station, stated this principle when the Station was organized in 1887: "Pennsylvania has been in the past largely a grain producing state, her farmers exporting the fertility of their soil along with their grain, and using commercial fertilizers largely to replace the elements thus lost from the soil. To replace the elements of fertility contained in a wheat crop . . . by means of commercial fertilizers, requires, at average prices, the expenditure of about one-fourth of the gross receipts for the wheat. . . . The remedy . . . lies, in my judgment, in the more extensive rearing and feeding of livestock, thus conserving and increasing the fertility of the soil instead of constantly drawing on it."[11] Fortunately for Pennsylvania, the Experiment Station then began to devote a large proportion of its meager resources to research on the care and feeding of livestock and so was able to give impetus to the livestock industry. By 1926 it could be asserted, "The products of 80 per cent of the improved farm area of the State are marketed through live stock."[12]

After the collapse of wheat farming as a specialty, the emphasis in livestock husbandry was at first on beef cattle, sheep, and hogs. Chester, Delaware, and Lancaster counties, particularly Chester, were the most important exponents of beef cattle farming in America. In 1861 the editor of *Evans' Rural Economist* set forth its advantages: "Many farmers in this vicinity (Chester County), while pursuing the standard rotation of crops—corn, oats, wheat and grass—feed all the produce of their farms except the wheat to their own stock and in this way, by managing the manure heap properly, they return to the soil with this manure nearly all the needed elements of fertility."[13] In a later issue of his journal Evans gives further details: "The system of farming pursued in Chester County is a mixed one, both grain farming and grazing. A farm of 100 acres will, in most cases, be laid out into fields of eight acres so that there will be, each year, twenty-four acres in grain and the remaining fields in grass of which, perhaps, three will be for hay and three or four for pasture. . . . A farmer will lay in twenty head of steers to fatten for market and carry twenty to thirty sheep, besides the necessary number of working oxen and horses, also his hogs."[14]

With many modifications, this soil-building type of farming, especially the substitution of dairy cows for other livestock, has been followed in many parts of the State ever since. In 1877 a Cumberland Valley farmer recorded his observations: "Most of the progressive farmers of the Cumberland Valley feed cattle during the winter, not with a view of making money directly on the cattle, but for the purpose of increasing the quantity and quality of the manure pile. . . . The net gain over the winter averages $28.50 a steer. This pays well for the feed and the farmer still has the manure pile, which pays him well for his labor."[15] In addition, he marketed his crops through livestock. It has been said of Lancaster County, which now is the center of steer feeding in the State, that the Lancaster County farmer raises more tobacco, so that he can buy more steers, so that he produce more manure with which to raise more tobacco. This is literally and profitably true.

After 1870, dairy cows gradually superseded beeves as soil builders. In 1886 a committee of the State Board of Agriculture reported, "The cheapest way of maintaining the fertility of our soils in a large portion of the State is to grow more grass for pasturage and hay, and to raise sufficient stock to consume it, thereby increasing the 'farmer's gold mine' (the manure pile)."[16]

Specific evidence of the outstanding contribution of the dairy cow to the maintenance of soil fertility was given by a Bucks County farmer in 1889: "About thirty years ago Swamp Farm supported about ten cows and a heifer or two and three horses. Twenty years later the land improved sufficiently to support eighteen head of neat cattle and four horses. Later, under a system of liberal feeding, and laying many underdrains, the fertility of the soil enables us to raise coarse fodder, to carry through thirty-five head neat cattle, five to seven horses, and sell from ten to twenty tons of hay each year. And yet the limit of productiveness is not nearer now than thirty years ago."[17] This has been the experience of dairy farmers ever since, and is one reason why Pennsylvania farms, as a whole, are increasingly productive. Farmers who specialize in crop husbandry and keep little or no livestock can approximate these results, but at greater expense, by the use of crop rotations, cover crops, liming, and commercial fertilizers.

In the early days of dairying, when most milk was converted into butter on the farm and the skimmed milk fed to hogs, the loss of fertility was less than it is today when most milk is sold as whole milk. When horses were the main dependence for draft power on the farm and in cities, timothy hay was in great demand, and many farms specialized in producing it. This type of farming depleted soil fertility. Every ton of timothy hay sold carried away from the farm about $5.60 worth of the essential plant foods; clover hay, $10; wheat, $8.80; milk, $2.60. Between 1909 and 1924 there was a decrease of 130,000 acres in timothy hay and a corresponding increase in the acreage of red clover and alfalfa for feeding on the farm; this shift greatly promoted the maintenance of soil fertility.

Although about half to three-fourths of the nutrients in feeds commonly are recovered in the manure, even dairying will deplete a farm unless sufficient concentrates are bought to compensate for the loss or it is met by the use of fertilizers. These concentrates usually are rich in protein, hence in nitrogen. In general, the larger the proportion of the feed crops raised that are fed on the farm, the better.

About one-fourth of Pennsylvania farms are operated by tenants. The organization of tenant farming has an important bearing on the maintenance of soil fertility, particularly the terms of the lease with respect to the disposition of crops raised. The limestone soils of Lancaster County, which has the highest per cent of leased farms in the State, do not appear to be diminishing in fertility because of tenant farming; but these farmers take great care to maintain soil fertility.

MANURES

The foregoing discussion has indicated the paramount value of manure in the maintenance of soil fertility. Until after 1890 this was recognized by only a few. The cheaply constructed log barns and stables of colonial Pennsylvania often were abandoned or moved when piles of manure made access to them difficult. In 1848 a Wayne County farmer stated, "Barns and stables are not often moved for the purpose of getting rid of a troublesome manure heap; but manure is often permitted to accumulate about them and waste before it is removed to the field."[18] Most of the plant food in the manure was lost by leaching.

The general negligence in the care of manure at that time is evidenced by a statement in *Pennsylvania Farm Journal* in 1851: "How few barn or cattle yards are planned with a view to economy in making and saving manure. . . . With every rain the water passes in from all quarters, except one, where it is discharged into the high-way, or an adjacent stream or a ditch, carrying with it and wasting the very essence of the manure; the soluble portions."[19] The discharge of manure water into streams was so common that at a later date the Pennsylvania Department of Health sought to remove this source of pollution of the water supply of the State.

In 1854 it was reported that scarcely one farmer in Derry Township, Dauphin County, kept manure under roof.[20] Even as late as 1880 manure was considered a nuisance in parts of central and western Pennsylvania. As recalled by one dairyman in 1882, "It was but a few years ago that I saw manure from the stables of Franklin and Oil City being dumped into French creek and the Allegheny river, as the most convenient place to get rid of it."[21]

Beginning about 1870 an old Flemish proverb, "No grass, no cattle; no cattle, no manure; no manure, no crops,"[22] was oft quoted in this State, and farmers generally began to give more attention to this primary source of soil fertility. They began to build concrete manure pits and to use more bedding. Many began to haul manure out frequently instead of but once a year. In 1879 Frederick Watts of Cumberland County, said, "The custom is almost universal of putting all manure upon the oats stubble, preparatory to the wheat crop which follows it."[23] The present practice is to spread it on sod before corn.

After 1900 many farmers found it profitable to "reinforce" manure at its point of greatest deficiency, phosphoric acid, by sprinkling superphosphate on it in the stable or on the piles. So highly do the Plain People of Lancaster County regard manure that they adopted the silo shortly after 1900 only after having been assured that feeding of ensilage to their livestock would not lessen the value of the manure. Synthetic "manure," made by composting wheat or other straw and adding to it certain materials as ammonium sulphate, urea, cyanamid, ground limestone, and superphosphate, was first made in England about 1920. It has found little application in general farming, but in the culture of mushrooms it has been useful as a substitute for horse manure, the medium on which this vegetable has been grown.

Until about 1916, farmers living near cities had access to large quantities of livery stable manure and street sweepings. The substitution of motors for horses, both in the cities and on farms, eliminated this important source of fertility. Compensation for the loss of horse manure was found, in part, in the larger quantity derived from dairy cattle.

GREEN MANURING

The practice of plowing under certain crops for the purpose of improving the physical condition of the soil and promoting its biological activity is of ancient origin. It has been used in Pennsylvania since the founding of the colony, but now is restricted mainly to plowing under sods or cover crops. Green manuring has had both enthusiastic partisans and bitter opponents. In 1852 James Gowen, a prominent gentleman farmer and livestock breeder near Philadelphia, voiced his disapproval: "Of all the time-wasting, land-cheating practices, none is more to be deprecated than that of turning in green crops, as a succedaneum for manure. . . . No good husbandman would think of pursuing such a course."[24] This position was challenged by many of his contemporaries. A Bradford County farmer rejoined, "The practice of turning in green crops, especially clover, should be encouraged and practised much more than it is."[25] Leguminous crops were preferred for this purpose long before their special value in the fixation of nitrogen from the air was known.

Red clover has been the premier green manuring crop of Pennsylvania for two centuries. In 1853 a Franklin County farmer reported that sowing red clover among corn was a common practice there. Instead of following corn with oats, in the usual rotation, they sowed clover at the last cultivation of the corn, in July. It afforded early pasture in the spring; then the cattle were kept off until after harvest, when it was turned under for wheat.[26]

There came a time, however, when red clover did not grow as luxuriant on the older fields as when they were first cleared. It became increasingly difficult to get a stand and the clover was yellowish and sickly. Farmers said the soil was "clover sick." In 1899 this discouraging situation was reported by Alva Agee: "A big percentage of the land that is not comparatively new to clover fails to make a good growth of clean clover two seedings out of three, and much of it fails at every seeding. The result is that many farmers no longer sow clover without timothy, and two-thirds of the plants in the 'clover field' are timothy. Formerly a purely clover sod could be gotten. . . . The clover dwindles and quits, while the soil may contain sufficient fertility to produce a big crop of wheat."[27] Clover sickness was most prevalent from 1875 to 1900, which was a period of general neglect of liming, dependence being placed on commercial fertilizers alone. After 1900, with regular applications of lime and mineral fertilizers, clover sickness became comparatively unknown.

Other leguminous crops sometimes were grown for green manuring. About 1903 William P. Massey, editor of *Practical Farmer,* and H. W. Collingwood, editor of *Rural New Yorker,* strongly advocated the use of the southern cow pea for this purpose, but it proved unsuitable in Pennsylvania. A few years later crimson clover was hailed as "queen of soil improving crops." This, likewise, failed to measure up to expectations, primarily because it winter-killed. Sweet clover has been used somewhat, especially by potato and fruit growers. Occasionally crops of alfalfa, soy beans, and sometimes buckwheat or rye, are plowed under; but red clover remains the most popular green manuring crop.

The nitrogen-fixing bacteria that live in the nodules on the roots of leguminous plants are not present in soils in which these crops have not been grown before; they must be introduced. In early days it was customary to secure soil from a field in which the particular legume had been grown for several years and scatter it over the new field at the rate of about a bushel to the acre, harrowing it in immediately. This method was expensive, and sometimes it introduced weeds. In 1904 a bacteriologist of the United States Department of Agriculture devised a method of making artificial cultures of the bacteria in a dry state on absorbent cotton. Commercial firms sold enough of these cultures to inoculate seed for one acre for $2.00 They proved to be unreliable, since drying soon killed the bacteria.[28] The agar or muck cultures used in recent years have given satisfactory results.

About 1900 a new term, "cover crops," was added to the vocabulary of agriculture. These were crops grown for the specific purpose of covering the land during late summer, fall, and winter to prevent erosion and to add organic matter to the soil when turned under in the spring. This was an old practice under a new name. Cover crops were most commonly grown on corn stubble and in orchards, being sown at the last cultivation in midsummer or later. A variety of crops was used, both legumes and non-legumes, such as crimson clover, hairy vetch, sweet clover, and rye. Since 1935 domestic rye grass has largely superseded other species for use as a winter cover because of the ease with which a stand may be secured and the large amount of organic matter added to the soil, especially in its extensive root system.

Grass is the premier soil-building crop. In general, the grains and tilled crops make heavy drafts upon soil fertility, especially by reducing the organic content of the soil and favoring erosion; whereas sods, either legumes or non-legumes, build up soil fertility, particularly by adding to the organic content and by reducing loss from erosion. After being under experiment for seventy-two years, the unfertilized sod strips that divide the Jordan Soil Fertility Plots at the Pennsylvania State College had an organic-matter level averaging thirty-three per cent above that of adjacent plots in a corn-oats-wheat-grass rotation which had been manured, limed, and fertilized according to standard practice. Pennsylvania is naturally a grass state. The much greater emphasis that has been placed in recent years on grass culture, both as permanent pastures and as sods to plow under, reflects the growing conviction of Pennsylvania farmers that grass is one of the most important factors in maintaining soil fertility.

LIME

After 1840 lime superseded gypsum or land plaster as a soil amendment, although gypsum (sulphate of lime) was used to some extent until 1880, especially in central and western Pennsylvania. It was applied most commonly for red clover and as a top-dressing for corn and potatoes. The amount that could be held between the thumb and two fingers was dropped on every hill of corn or potatoes soon after the seed sprouted. Occasionally it was mixed with dried chicken manure. The reasons for the beneficial effect of gypsum, in the very small amounts applied, are not clearly understood. After superphosphate, which is half gypsum, came into use there was no further need to apply this soil amendment.

Lime was applied to land from the founding of the colony. Even during the period of greatest enthusiasm for gypsum, from 1790 to 1820, many farmers clung to the time-honored practice of liming, especially German farmers of Berks, Lancaster, and York counties. At that time lime, like gypsum, was considered to be a "fertilizer." In 1838 William P. Kinser of Lancaster County recorded, "The improvement which has been effected within the last twenty years in several of the eastern counties . . . , (and *especially* in Chester,) is almost incredible. And the whole is mainly attributed to the regular and judicious use of lime as a manure . . . . To the farmers in that quarter, lime is the 'anchor of hope.'"[29] In 1839 the Philadelphia Society for Promoting Agriculture was informed that "by the use of lime and gypsum several counties have been recovered from sterility to the highest possible state of productiveness. Among the farms thus restored, may be mentioned that of William West, of Delaware County, to whom may in a great measure be abscribed the happy change which commenced in the general management of upland farms."[30] At that time there was a saying in Chester County, "If lime puts a farmer in jail (for debt) it will bring him out again." According to the editor of *Farmers' Cabinet,* in 1844, "The German farmers of Lancaster, Chester, and the adjoining counties of Pennsylvania, use lime more extensively than in any other part of this country."[31]

From 1840 to 1860, before the advent of commercial fertilizers in quantity, paeans of praise to the value of liming were sung throughout the eastern part of the State. "Within my recollection," said N. Linton of Cochranville, Chester county, in 1852, " . . . . old worn-out commons and russet-colored pastures have been changed into fertile fields, and have proved mines of wealth to many who undertook their renovation. The principal agent employed in producing this change was lime. Its application often produced magical effects; and the crops of hay and straw thus produced, afforded the means of making considerable barn-yard manure . . . . Old fields, which were purchased for from $5 to $10 per acre, would now command from $40 to $60 per acre."[32]

Similar evidence came from Berks, Lancaster, and the other older counties. A Lancaster County farmer wrote in 1851 of the amazing improvement of the hilly part of his county during the previous fifteen or twenty years as a result of applying plaster and then lime. "Instead of the sterile fields marked with a sparse growth of stunted grass and brambles, and the miserable wooden tenements and rickety fences . . . you now behold comfortable brick or stone mansions and good bank barns . . . the fields neatly enclosed . . . . The yield of grain has been increased . . . five fold; and where no grass was formerly grown, they have now abundant crops."[33] A Dauphin County farmer added his tribute: "Next to stable manure lime is believed to be the cheapest [fertilizer], costing from six and a half to seven cents per bushel, at the kills . . . It is applied to the soil at the rate of one hundred bushels of quick lime per acre, that is on gravel or limestone soil, or sand or red-shale at the rate of sixty bushels per acre, repeated on the former every eight years and on the latter every five years. [It] has frequently increased the crop one hundred per cent on gravel soil . . . ; on limestone soil . . . the increase has in many instances been more than fifty per cent."[34]

As long as lime was used as a "fertilizer" it was inevitable that ultimately the results should be disappointing; after soil acidity had been neutralized, no further beneficial results followed. "Lime now doesn't pay, it used to, but doesn't now," complained a Chester County farmer in 1871.[35] In 1875 the Solebury Farmers' Club of Bucks County after comparing results secured with lime, guano, superphosphate, poudrette, and bone dust, resolved, "Lime is the most *economical* and *reliable* fertilizer the farmer can buy";[36] but very soon thereafter the evidence was quite the contrary.

William Frear, who was largely responsible for the renaissance of liming after 1900 says, "The practice [of liming], very generally followed up to 1875, fell off considerably during the last quarter of the nineteenth century, the period of rapid development of the commercial fertilizer trade."[37] It was the common opinion then that liming "exhausted" the soil, which certainly was true if its organic content was not maintained by manuring, green manuring, or sods. In 1900 William Frear made a survey of the use of lime in Pennsylvania and reported, "Of the sixty-three counties reporting, sixteen show no use of lime; in ten or more, it is used by only a few farmers, and in ten or more, less than half, while in ten, it is said to be used to some extent by 75 to 100 per cent. of the farmers. The greater use is found in the eastern and southern parts of the State."[38]

After 1900 liming again came into favor, primarily for correcting soil acidity in preparation for the culture of grass and legumes, whereas in earlier years it had been used mainly to liberate plant food in the soil and to improve soil texture. By 1911 more than half of the lime-producing plants in the United States were in Pennsylvania, but much more of their product was used in the building industry and in manufacture than in agriculture.

In 1915 the General Assembly passed the Agriculture Lime Law. This gave to farmers the same protection in the use of lime as the act of 1879 had given in the use of commercial fertilizers. It required all agricultural lime offered for sale to be registered each calendar year and a printed guarantee of the minimum percentage of calcium oxide and magnesium oxide placed on each package. For pulverized limestone or oyster shells a guarantee of the degree of fineness also was required—the percentage that would pass through a 20, 60, and 100 mesh sieve. In the first year of the operation of the law, seventy-seven brands of lime were registered, of which forty were from Pennsylvania firms. The number of brands registered in 1940 was 169, of which fifty-four were pulverized limestone, fifty were hydrated lime, thirty-six burned lime, and twenty-eight miscellaneous products. That there still was need for governmental check of lime products was evidenced by the fact that in 1933, of 142 samples analyzed, fifteen were deficient.

In the early years lime was applied almost exclusively in the form of burned lime or calcium oxide. Most of this was made on the farm; many farms in limestone areas had small kilns. During the slack season the farmer quarried limestone rock and cut wood or hauled coal to burn it. This is rarely done now except during depresssion periods when money is scarce. In the spring of 1935 an editor of *Pennsylvania Farmer* made a trip through Somerset County and reported, "I counted fourteen lime stacks . . . [within] a distance of thirteen miles. These stacks were built in the old-fashioned way with layers of limestone alternating with layers of wood and coal and the whole pile plastered over with mud. Apparently the stone was quarried and the coal and wood hauled during the winter months."[59] In recent years most farmers have found it more economical to buy lime from commercial plants than to burn it themselves.

After 1915 much lime was applied in the form of ground limestone, calcium carbonate, instead of quick lime. In areas remote from railroads there were quite a number of farm-owned cooperative limestone pulverizers which were used by farmers in succession. These were soon abandoned. Ground limestone has grown in favor steadily; in 1939 the sales of agricultural lime in this State were: pulverized limestone, 368,000 tons; burned lime, 83,000 tons; hydrated lime, 74,000 tons.

Pennsylvania is the first state in the Union in the production of lime and its use in agriculture. In 1935 it had one third of the lime plants of the country, located in twenty-two counties, of which Centre, York, Lebanon, Chester, and Montgomery were the most important. A study made in 1920 revealed that seventy-two per cent of Pennsylvania farm soils are too acid for the most efficient production of crops, especially legumes.[40] The range is from Potter County, which requires an average of 8,000 pounds of calcium carbonate an acre to neutralize the acidity of its soils, to Lehigh County, which requires only 124 pounds. Red clover fails on about half the soils of the State if they are not limed. In 1940 Pennsylvania farmers purchased 820,000 tons of lime valued at $3,690,000 in addition to the considerable amount made on farms. Counties which used the most lime that year were Mercer, 30,070 tons; Westmoreland, 29,230; Bradford, 27,350 tons.[41]

COMMERCIAL MANURES

The first commercial fertilizer to achieve any considerable prominence was guano. This was not a chemical fertilizer but a manure, the dried and pulverized droppings of sea fowls collected from rainless islands off Peru, Chile, and Patagonia. Peruvian guano was preferred. Guano was a rich product; it averaged about ten per cent of ammonia and ten per cent of phosphoric acid. The first shipment to the United States was in 1842. In 1843 the editor of *Farmers' Cabinet* wrote, "A lot of *Guano* has been imported at Baltimore, for the purpose of giving farmers an opportunity to test its value. The editor of the American Farmer offers it for sale at 5½ cents per lb., stating that 100 lbs. are sufficient to manure an acre."[42]

For a time farmers were enthusiastic about the new "fertilizer." In the year ending June 30, 1850, there were imported into the United States 21,243 tons of guano, which were sold at $40 a ton. In 1851 the port of Philadelphia received 4,980 tons.[43] Two years later 100,000 tons were imported and it was said, "Farmers are scrambling and drawing lots for a single ton."[44] It then cost $60 a ton. Guano imports rose to 163,662 tons in 1854; thereafter they declined sharply. In 1858 only 54,057 tons were imported.[45]

The customary application of guano was 300 to 400 pounds to an acre. In 1853 the Chester-Delaware Agricultural Society reported, "Three hundred pounds of Peruvian guano are found to be quite equal, as a dressing for wheat, to the ordinary quantity of barnyard manure. The latter, however, is the main dependence of the farmer."[46] It was commonly recommended that guano be mixed with soil or gypsum and broadcasted and harrowed in; injury to crops resulted when it was applied directly to hills or rows and when it came into contact with seeds.

The price of guano ranged from $40 to $60 a ton except during the Civil War, when it rose to $75 a ton. After guano had been used a number of years, its beneficial effect diminished.

Widespread and flagrant adulteration of guano contributed to its downfall. Peat, coal ashes, soil, salt, and other materials were mixed with the imported article by unscrupulous dealers. At the time the farmer had no protection or recourse under the law. A correspondent of *Pennsylvania Farm Journal* in 1854 had a just complaint: "The adulteration of guano is carried on as extensively as the manufacture of bogus fertilizers . . . I have been told, and on good authority, that one of the most extensive dealers in guano in Baltimore is in the habit of taking his guano, which he purchases from the agent of the Peruvian government to a warehouse . . . and mixes it with—what? . . . to make with dirt and water an increase of one ton in ten."[47]

At a meeting of the State Agricultural Society on June 16, 1855, it was resolved: "Whereas, it is generally believed that a large portion of the several kinds of guano, now sold in our market, are, many of them, of a very inferior quality, and some of them almost worthless . . . Therefore; Resolved, That we . . . respectfully urge, upon the present Legislature the propriety of passing a law providing for the appointment of an Inspector of Guano for this State."[48] As was the custom at the time, the legislature turned a deaf ear to the plea of the farmers although agriculture was the major industry of the State. Eventually, dishonest dealers in guano destroyed their own business; by 1870 farmers had so completely lost confidence in the product that they refused to buy it. So great is the power of habit, however, that many farmers called commercial fertilizers "guano" for many years after that material had vanished from the market.

From 1840 to 1860 poudrette, which was manufactured in Philadelphia, was used to some extent. It was night soil from sewers and privies, dried, deodorized, pulverized, and mixed with ashes, muck, and gypsum. Like guano, it was mainly nitrogenous. In 1855 poudrette sold for $2.00 a barrel. After superphosphates came into general use there was no market for it.

COMMERCIAL FERTILIZERS, 1840-1879

The beginning of the commercial fertilizer industry was the promulgation by Justus von Liebig, in 1843, of his "mineral theory" of plant nutrition. Then came the discovery and commercial exploitation of geologic phosphate rock in South Carolina, Florida, and Tennessee, deposits of potash salts in Germany, and nitrate of soda in Chile. The chief raw materials for the fertilizer trade were now available. Some chemical fertilizers had been used sparingly before the advent of superphosphate. A few tons of nitrate of soda were shipped to America in 1830. In 1844 a limited amount of this chemical was available to farmers at five cents a pound and sulphate of ammonia at seven cents a pound.[49] Nitrate of soda was used by a few Pennsylvania farmers in 1853; it then cost sixty-five dollars a ton.[50] Saltpeter (nitrate of potash) was used experimentally between 1840 and 1855, but was expensive and difficult to obtain.

The first commercial fertilizer available in quantity was superphosphate of lime made from bones. Raw ground bone meal, or bone dust, was popular in England for some years before 1840. It did not give equally satisfactory results in Pennsylvania, where the less humid climate is not as favorable for its disintegration in the soil; nevertheless ground bone was used considerably for many years. In 1846 it was noted by a Philadelphia farm journal that "such is the demand for [ground bones] abroad, that agents are employed to purchase them here from a class of persons who traverse the country for a great distance, and gather them for this market. Hundreds, he might say thousands of tons, were shipped annually to Great Britain."[51] At times, the bone traffic was reversed. In 1860 *Farmer and Gardener* commented, "It is reported that a week or two since a shipment of bones, human bones, the bones of the poor fellows who took part in the memorable siege of Sevastopal—bones of Frenchmen, Englishmen, Russians and Italians—arrived at one of our eastern ports from the Crimea, to be converted into fertilizer."[52] In the same year it was stated, "Mills for the preparation of this valuable manure [bone dust], have been constructed in various parts of the State . . . . The fructifying qualities of bone dust have been favorably developed in the rapid growth of Indian corn when the manure is placed in the hill."[53] Large quantities of buffalo bones were shipped East from the West.

In 1843 Liebig showed that superphosphate of lime, the phosphoric acid which is more readily available than that in bone dust, could be made by treating bones with sulphuric acid. A few Pennsylvania farmers began to make it on the farm. They were advised: "Place 180 pounds of old bones in a hogshead and pour over them 60 pounds of sulphuric acid to which has been added an equal weight of water. When dissolved, mix with wood ashes and apply."

Matthew Rodgers of Mexico, Juniata County, relates that about 1851 or 1852 Samuel M. Adams and ex-Sheriff David McKinstry of Juniata County conceived the idea of manufacturing fertilizers for their own use from bones, which were plentiful in those days. Adams filled a large molasses hogshead with alternate layers of unleached wood ashes and bones and let it stand for four to six months, getting all the rain that fell, by which time the ashes had dissolved the bones. This mixture made a marked difference in the growth of his corn. McKinstry, on the other hand, broke up the bones fine and used strong acid to dissolve them and then mixed the dissolved bone and sand, ashes, and fine dirt so that he could broadcast it. He showed Rodgers' father how it had increased his crops, saying, "John, the time is coming when a fertilizer, something like mine, will be used all over our country."[54]

Sometimes these home-made superphosphates were mixed with guano or dried manure. For every ton of bones it was customary to use 500 pounds of sulphuric acid. The farm manufacture of superphosphate, however, was attended with so many disadvantages that it was abandoned when commercial brands became available.

The first mixed commercial fertilizer sold in America was called "manipulated guano" to distinguish it from Peruvian guano. After 1850 a number of "patent fertilizers," mostly superphosphates, were on the market. One of the most highly advertised and widely used was "Mapes' Superphosphate of Lime." This was manufactured by James Mapes, editor of *The Working Farmer* of New York, self-styled "Professor" and "Consulting Agricultural Chemist." Mapes had no scruples about using the editorial columns of his journal to "puff" his fertilizer and his claims for it were far from modest. In 1853 a Chester County correspondent of *Pennsylvania Farm Journal* said, "Some few tons [of Mapes' superphosphate of lime] were sold . . . in West Chester, last fall, but chiefly for the wheat . . . Our farmers have been quite captivated with the high-flown colors of the *advertisement* in the

Working Farmer, particularly where it speaks of an increase of a ton of hay to the acre, from the use of 100 lbs."[55]

The results from using Mapes' fertilizer were disappointing, although he became quite a wealthy man by the sale of his phosphate. In 1856 Dr. Samuel W. Johnson stated, "Of all the superphosphates I analyzed last year not one came up to a reasonable standard of quality."

In 1861 the Germantown *Telegraph,* which for many years devoted more space to agriculture than any other newspaper in the State, reported the results of a field test of eighteen different kinds of "artificial fertilizers" then in most common use. In addition to several brands of guano the list included "ground bone, meat and bone compost, superphosphate of lime, nitrogenized superphosphate of lime and poudrette."

The first "mixed" or "complete" commercial fertilizer was put on the market by William Davison and P. S. Chapel of Baltimore in 1850 By 1870 many brands purporting to contain all three of the essential plant foods were available to farmers, in addition to superphosphates made from bones and "acidulated South Carolina Rock." Muriate and sulphate of potash were used but slightly; wood ashes were the main source of potash. Matthew Rodgers of Juniata County relates that in 1879 two farmers in Juniata County who had been reading farm papers bought two and a half tons of patent fertilizer costing $42 a ton at the railroad. Their neighbors said they were fools, but when the harvest came the results were so remarkable that others joined in the procession.[56]

FERTILIZER FRAUDS

The high hopes entertained for "chemical agriculture" were realized only in part, not only because of unscrupulous manufacturers but also because of over-confidence in the value of chemical analysis of soils as a means of determining their fertilizer needs. Says John I. Falconer, "When it was found that certain mineral elements were required for the growth of plants and that these were furnished by the soil, it was proposed to analyze the soil and the plant, and from their chemical compositions to form the basis of treatment . . . Papers teemed with advertisements of 'chemists' and 'professors' who for the moderate sum of $5 or $10 dollars would analyze the soil and advise as to its treatment."[57] A soil analysis was thought to be an infallible guide to its fertilizer needs. State chemists in New York, Delaware, and Maryland analyzed soils for farmers without charge; in 1853 *Pennsylvania Farm Journal* expressed the hope that a similar arrangement might be made in this State. The rage for soil analyses began to wane about 1860; by that time the best agricultural chemists of the country had come to the conclusion that they were of little value unless supplemented by field tests.

By 1875 misrepresentation and fraud in the manufacture and sale of commerical fertilizers, especially mixed goods, had become so general that the long-suffering farmers rebelled. A farmer might pay $55 a ton for a fertilizer which was worth only $8, yet he had no redress under the law. The revolt of farmers had been brewing for several years. In 1861 the editor of *Farmer and Gardener* advocated the enactment of "a law which shall fix a standard for all artificial fertilizers."[58] He was quoting Dr. Evan Pugh, President of the recently organized Farmers' High School, later the Pennsylvania State College, and a well-trained agricultural chemist. Dr. Pugh had studied in Germany and had been associated with Lawes and Gilbert at the celebrated Rothamsted Experimental Farm, England.

In the brief period that he served at the Farmers' High School before his untimely death in 1864, Dr. Pugh was the most prominent exponent of the wise use of commercial fertilizers in the State. In a contribution to *The Farmer and Gardener* of July, 1860, he stated, "There is no subject at present of greater importance to farmers, than artificial manures. The soils all over the State are not producing the half of a crop, and there is a gradual diminution of the average yield per acre of our most important crops; while in England, France, Belgium and Germany, the use of artificial manures . . . has been steadily increasing the productiveness of the soil. Now there is no reason why the use of good artificial manures in this country, will not produce the same effect . . . And yet, while every town, almost, has its manure manufactories, no such generous results have followed the use of the articles they produce. Your own paper contains the advertisements of nearly a dozen of manure manufacturers, each one of which is given as the best in use, &c., and yet . . . they have not secured the confidence of the farmer."[59]

In September, 1860, Dr. Pugh announced that arrangements had been made to analyze commercial fertilizers at the Farmers' High School, although it was his opinion that this should be done by a State chemist. "The manures examined," he said, "[should be] obtained from persons who purchased them of the manufacturer *without the latter knowing that they were to be analyzed* . . . Complaints have been made that some of our United States manufacturers have sent out very different specimens for trial and analysis from those sent out in wholesale quantity."[60] This procedure was incorporated into the Pennsylvania fertilizer law passed in 1879. The results of fertilizer analyses by the Farmers' High School were published in several issues of *The Farmer and Gardener.*

Dr. Pugh was an unrelenting foe of unscrupulous fertilizer manufacturers. In December, 1860, he analyzed a "super-phosphate of lime" sold in Philadelphia at a high price and reported, "It was found to contain about three per cent of superphosphate . . . There are, no doubt, hundreds of tons of trash like this . . . sold to farmers. [They should] insist upon having a guarantee that the manure they purchase shall contain a certain specified amount of [plant food]."[61] In an address to the Cumberland County Agricultural Society in 1861 he said, "The whole traffic in guano has been so mixed with quackery, fraud and ignorance, . . . as to leave the farmer disgusted . . . or bewildered . . . Some years ago, in Chester County I . . . attempted to use artificial manures, but found it impossible to do so, in consequence of the frauds perpetrated in their sale. One that I bought at the rate of $30.00 per ton, turned out to be a mixture of leached ashes, common loam, and a little gypsum. . . . Recently, at the Farm School, we analyzed a manure, of which a large quantity was offered for sale in Philadelphia, at $30.00 per ton, it proved to be not worth $5.00 per ton."[62]

The analyses published by Dr. Pugh exposed several frauds and led to considerable improvement. His exposure of the comparative worthlessness of the much publicized Mapes' Superphosphate of Lime, in *Country Gentlemen* for March 27, 1862, created a furor. Dr. Pugh justly may be considered the father of the Pennsylvania fertilizer law of 1879, even though he did not live to see it enacted.

The forward look of the Farmers' High School in agricultural science under the guidance of its first President is evidenced by the titles of some of the theses of graduates between 1860 and 1863; these were based on original research:[63]

"On the manufacture of superphosphate of lime."
"On some ground bones and raw bone superphosphates on the market."
"On ordinary superphosphates and other artificial manures on the market."
"On limestones of the Kishacoquillas Valley."
"On chemical and physical analyses of soils."

THE FERTILIZER LAW OF 1879

The resentment of farmers against fraudulent fertilizers reached the boiling point in 1877, when an attempt was made to secure a State regulatory law having provisions that had been recommended by Dr. Pugh years before. The legislature failed to respond to the plea of farmers. Two years later, however, under the prodding of Thomas J. Edge, Secretary of the State Board of Agriculture, it passed such a law. Secretary Edge informed the legislators, "The surrounding states of New Jersey, Delaware, and Maryland, . . . in some measure, protect the farmer . . . Pennsylvania is a market for all kinds of fraudulent manures, which cannot be offered elswhere . . . . Out of not less than $1,500,000 expended [annually] by our farmers for forty-five thousand tons of fertilizers, at least one fourth is a direct loss from fraudulent goods:"[64]

This law marked the turning point in the use of commercial fertilizers. Even before the law was passed, however, the newly organized State

Board of Agriculture had employed Dr. F. A. Genth, a chemist at The University of Pennsylvania, to analyze fertilizers on the market. In 1877 he reported his analyses in terms of "insoluble phosphoric acid, soluble phosphoric acid, potash and ammonia," and estimated the "commercial value" of each. There were about thirty brands sold in the State at that time, several of them manufactured by Baugh & Sons and by Walton, Whann & Co. of Philadelphia. The most popular were Baugh's Ammoniated Dissolved Rock and Whann's Acid Phosphate. Some bone dust, muriate and sulphate of potash, nitrate of soda, kanite, and sulphate of ammonia were used also. It was stated, "All the others [except guanos from Sombrero and Navassa] have been driven from this market since the development of the beds of phosphatic nodules in South Carolina, which was discovered in August, 1867, and from which phosphates can be furnished for less than the freight from other sources would amount to."[65]

The fertilizer law of 1879 required that manufacturers be licensed, and a tag placed on every package giving the guaranteed analysis, and made provision for sampling and for official analyses. It stated, "The term 'commercial fertilizers' as used in this act shall be taken to mean any and every substance imported, manufactured, prepared or sold for fertilizing and manuring purposes except barnyard manure, marl, lime and wood ashes." The State Board of Agriculture was designated to enforce the law. When it went into effect, the number of brands on sale in the State had increased to ninety-six, offered for sale by fifty manufacturers.[66] Pennsylvania farmers expended $3,525,000 for commercial fertilizers that year. So effective was the law in driving fraudulent and sub-standard brands off the market and restoring the confidence of the farmers that in 1919, a wartime year, they expended $15,628,341 for this purpose.[67] In that year the number of brands registered was 503, manufactured by seventy different firms.[68]

For the first few years of the operation of the law, there were many prosecutions. The reports of the State Board of Agriculture contained numerous statements like these: "A fertilizer originating in Pittsburgh and selling at $12 to $20 a ton, according to freight and location, was found on analysis to be worth but fifty-one cents a ton"; and "A 'fertilizer' from Lawrence county was found to possess a value of four dollars and twelve cents, with a selling price of thirty dollars [a ton]."[69] By 1900 most of the frauds had been eliminated; thereafter few prosecutions were necessary. In 1937 the State Department of Agriculture reported, "Of the 1,353 official samples [of fertilizers] analyzed, 111 or 8.2% were found to be deficient in one or more elements of plant food, compared with guarantees to the extent of .2% or more . . . [However] many of the samples were not seriously deficient and were, to a large extent, balanced by overages in other elements, so that there was no monetary loss to the consumer."[70] Most of the deficiencies were in complete fertilizers.

The fertilizer law of 1879 served not only to protect farmers against fraud but also to inform them of the specific plant food requirements of crops. For many years they had called all commercial fertilizers "phosphate." In the early years of the industry many fertilizers were made largely from waste products; nitrogen came mostly from cheap organic materials, as garbage, tankage, hair, woolen waste, and leather. At that time some farmers relied largely on their noses in choosing a brand; the one that smelled the rankest, they thought, was likely to be the best. Fertilizers now on the market are made mostly from chemicals, not wastes, and have little or no odor.

The fertilizer law of 1879 was amended from time to time to meet new situations in the industry and on the farm. The most important amendment was that of 1925; this prohibited the sale of mixed fertilizers containing less than fourteen units (per cent) of total plant food. Low grade fertilizers had been popular with some farmers simply because they were cheap. In 1922, of the 930 brands of complete fertilizers registered, 475 contained less than fourteen units. Low grade fertilizers were an economic loss to farmers since they had to handle and pay freight on much worthless filler. In 1933 the minimum standard for complete fertilizers was raised to sixteen units. Simplification of the guarantee was achieved in 1931, when the law was amended by substituting nitrogen for ammonia. In 1940 every sack of fertilizer sold in the State bore a tag showing the guaranteed analysis of nitrogen, total phosphoric acid, available phosphoric acid, and potash soluble in water; and it was required that mixed fertilizers contain not less than one per cent of each of the essential plant foods.

RECENT DEVELOPMENTS

In recent years the number of brands of commercial fertilizers has been greatly reduced; in 1940 only 451 brands were sold in Pennsylvania as compared with 1,500 in some earlier years. Of these, 324 were complete fertilizers, fifty-two were superphosphate, and forty-two were rock (superphosphate) and potash. The trend is definitely toward greater use of complete fertilizer; 247,374 tons of the 357,875 tons sold in 1940 were mixed goods.[71] The most common formulae were 2-9-5 (two per cent nitrogen, nine per cent phosphoric acid, five percent potash), 2-8-10, 4-8-7, and 1-10-5. Higher grade brands, such as 8-16-16 and 4-16-8, were used occasionally, especially for vegetables and potatoes. Usually, high grade fertilizers are lower in price per unit of plant food. The average plant food content of commercial fertilizers increased from thirteen per cent in 1880 to eighteen per cent in 1934.

There has been little change in the original sources of plant food. The four most important sources are nitrate of soda, muriate or sulphate of potash, sulphate of ammonia, and rock phosphate. About 1890 there was much interest in "slag phosphate" or "basic slag," a by-product in the manufacture of steel from iron ore rich in phosphorus. This material was produced in 1870 by Jacob Reese of Pittsburgh, who obtained a patent in 1888, and put it on the market as "Odorless Phosphate."[72] It failed to meet favor, mainly because it was a by-product and hence in comparatively limited supply. Pennsylvania leads all states in the production of sulphate of ammonia, a by-product in burning of bituminous coal to make coke.

Between 1904 and 1914 there was much interest in the possibility of using raw ground rock phosphate, or "floats," instead of acid-treated rock or superphosphate, since a unit of phosphoric acid in ground rock is much cheaper than a unit in superphosphate. The proposed substitution proved unwise because the phosphoric acid in ground rock is much more slowly available, especially in the absence of a liberal supply of manure or other organic material. Nitrogen compounds secured from the air by means of high tension electrical discharge, as calcium cyanamid, have been used somewhat. On some of the oldest and most intensively farmed soils in southeastern Pennsylvania it has been found helpful in securing maximum yields to apply one or more of the so-called "trace elements," such as boron and magnesium, in addition to the three traditional plant foods.

In 1926 commercial fertilizers were used on eighty-one per cent of Pennsylvania farms, the average amount applied being two and a quarter tons to a farm.[73] More than one third of the 370,000 tons used in 1940 was applied in the seven southeastern counties of Bucks Chester, Berks, Lancaster, York, Adams, and Franklin. Lancaster County led, with 32,750 tons.[74]

The kind and amount of fertilizer applied depend not only on the needs of the soil and its management but also on the crop. Grains are particularly responsive to applications of phosphoric acid, and tobacco and potatoes to potash. Truck crops, potatoes, and tobacco, which have a high potential money value to the acre, may respond profitably to very heavy applications, sometimes a ton to an acre of such high grade goods as 4-8-8 or 5-10-10; whereas the common application for corn and small grains is 250 pounds to an acre of 3-12-6 if used with manure and sod. Superphosphate rarely is used alone now except on pastures.

During World War I, 1914-1920, farmers experienced great difficulty in securing fertilizer. The supply of potash salts from Germany was practically cut off by embargo and blockade, and ships and freight cars were not available to transport nitrates from Chile or phosphate rock from the South. Moreover, nitrates were needed to make explosives. Farmers who specialized in potatoes, tobacco, or truck crops were under the heaviest handicap, for these crops need potash. The price of muriate of potash rose from $40 a ton in March, 1914, to $60 in January, 1915; $114 in March, 1915; $225 in June, 1915; $245 in December, 1915; and $375 to $600 in January, 1916. After it passed the $60 mark it was beyond the reach of most farmers. The government made a frantic search for native sources of potash, but with little success. A small amount—not over five per cent of normal requirements—was derived from the giant kelp of the Pacific, cement dust, alunite, and wood ashes. Fortunately, potash is not a major deficiency on most Pennsylvania soils. After September, 1915, the price of superphosphate, also, began to rise, because of higher labor costs, because sulphuric acid was needed in the manufacture of munitions as well as superphosphate, and because more of it was used in the absence of other fertilizers.

The scarcity of nitrogenous fertilizers was met, in part, by more efficient saving and use of manures and by green manuring, together with the more extended use of organic nitrogen from dried blood and tankage. In 1918 the federal government purchased 100,000 tons of nitrate of soda from Chile and sold it to farmers for $75.50 a ton, but this was only a fraction of the need.

During World War I the government took over and operated the railroads and gave priority in transportation to the movement of soldiers and war supplies. Many farmers could not get any fertilizer at all because they did not have priority status. Manufacturers of fertilizers had a hectic time; materials were very difficult to secure, if available at all, and transportation conditions were chaotic. Burlap sacks which had sold before the war for $60 a thousand sky-rocketed to $300. There was one compensation—manufacturers were obliged to reduce the number of their brands. After the war this policy became permanent.

After the fiasco of early attempts to determine the fertilizer requirements of soils by soil analyses alone, recourse was had to comparative tests of different fertilizers in the field, as interpreted in terms of relative yields. Such tests were begun at the Eastern, Western, and Central Experimental Farms about 1870 under the general supervision of the Farmers' High School, but were not conducted long enough and carefully enough to yield dependable evidence. In 1881 William H. Jordan established the extensive series of fertilizer tests at The Pennsylvania State College now known as the Jordan Soil Fertility Plots. On these plots, crops in the standard Pennsylvania rotation—corn, oats and wheat, and grass—were grown under different fertilizer treatments. These are the oldest continuous soil fertility plots in America, and from them have come much important evidence on the nutrition of farm crops. In June, 1931, the fiftieth anniversary of the plots was observed at a meeting of distinguished soil scientists from twenty-two states and several foreign countries.[75] At that time the most outstanding results were summarized: "Phosphoric acid is the first limiting element in the Hagerstown loam. When used alone, or in any combination, it has resulted in a substantial increase in yield. Nitrogen and potash, applied separately or together, have had little influence on yield. . . . Although potash did not increase yields when applied alone, it was used with profit with phosphoric acid, and with nitrogen and phosphoric acid."[76]

Experimental results from the Jordan plots apply, in principle, to other soils of the State, but not in detail. Since farmers usually are averse to making plot tests which require careful measurements, the so-called "quick tests" of soils have been recommended by some. Many commercial agencies and some farmers have used them, supposing them to be a reliable guide to fertilizer practice. Like complete soil analyses, however, their value is limited. They are useful in determining the general level of fertility, but are not reliable as a specific guide to fertilizer practice unless made and interpreted by a soil scientist who has knowledge of other soil fertility factors, especially previous management of the soil. The test for lime requirements, however, is simple and accurate.

About 1925 W. F. Gericke, of the University of California, developed a method of growing certain crops without soil. The seeds were sprouted in moistened excelsior, sawdust, or peat, and the roots fed in tanks of chemical nutrient solution. This "soil-less farming" received far more publicity than its real usefulness warranted. It was found to be practicable only for certain greenhouse crops, as tomatoes and carnations, and under very abnormal out-of-door conditions, such as rocky islands of the sea where there is little soil. A few enthusiasts for "agrobiology" or "agrochemistry" envisoned the time when the traditional method of producing crops on soil would be superseded by growing them in electrically heated, thermostatically regulated tanks of water to which were added exact and balanced nutritive material. This remains a dream; the soil still feeds the human race.

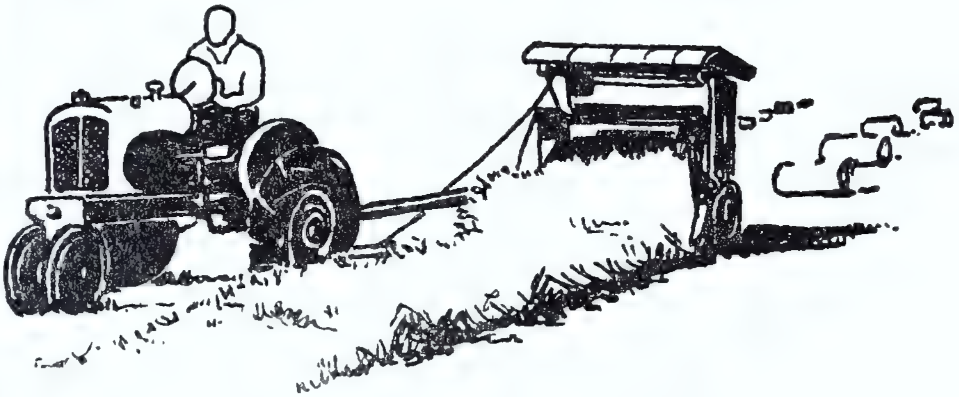
After having been cropped for three centuries, many Pennsylvania farms are much more productive than they were when first brought under the plow.

J. B. R. Dickey has computed the average yields of corn and wheat by periods:

	1872-1912	*1913-1940*
Corn	32.5 bushels	41.2 bushels
Wheat	14.7 bushels	18.8 bushels

This is an average increase of twenty-six per cent for corn and twenty-seven per cent for wheat since 1872. Part of this increase may be attributed to the abandonment in recent years of much submarginal land that formerly was farmed, but most of it reflects the gradual increase in the crop-producing power of Pennsylvania farms.

VI



Rotary type one-man pick-up baler

FEED CROPS

UNLIKE THOSE of a century ago, today's crops are produced primarily to feed to livestock, not to sell. "Only 18.7 per cent of the Pennsylvania farm income in 1939 was from field crops sold. . . . Nearly all the hay and silage and a large proportion of the grain was consumed on the farms where grown. Much of the remainder was used on other farms in the same community."[1]

SHIFTS IN CROP PRODUCTION

Crop production was remarkably stable between 1840 and 1940; there was no marked change in the total production of the ten leading harvested crops, although there was considerable change in that of individual crops. Although the total acreage in crops was somewhat less in 1940 than in 1840, production was considerably higher because of better culture and better varieties. The acreage of corn, hay, and alfalfa increased, as might be expected in a State in which dairying is the leading farm enterprise. Hay has been the most important farm crop since 1900 except in occasional years, as during World War I, when wheat displaced it. The acreage of wheat, oats, rye, and buckwheat has fallen off considerably; barley is the only small grain to show an increase. The greatly increased prominence given to pastures in recent years is additional evidence of the shift to livestock. In 1940 the four crops in the standard rotation—corn, oats, wheat, and grass—comprised eighty-five per cent of the total crops harvested.

The balance between crops and livestock has been practically the same since 1880. For each one hundred acres of crops the animal units carried (a unit is one cow, horse, or steer, seven sheep, five swine, or 100 poultry) have been about thirty-three. It is significant that counties that have led in crop production, as Lancaster, also have led in animal production. On most farms all the roughage and a large proportion of the concentrates are produced on the farm, together with one or more grains for direct sale. The most important cash crops, aside from fruits and vegetables that are produced on specialized farms, are wheat, potatoes, and tobacco.

One of the most important developments in crop husbandry has been the improvement in both yield and quality through application of the principles of breeding. This dates from 1900, when the work on the laws of heredity by Gregor Mendel, an Augustinian monk of Europe, was re-discovered. He had reported his experiments in 1865, but they attracted little attention then and were soon forgotten. Mendel's laws of heredity, together with De Vries' theory of mutation (1902) and Morgan's theory of genes (1910), revolutionized the science and practice of plant and animal breeding. Beginning with corn breeding, about 1905, the new knowledge soon was extended to all the major crops. High yielding and disease-resistant varieties and strains of superior market value replaced most of the older varieties. The commercial culture of hybrid corn is one of the most outstanding advances in agricultural technique in modern times.

Pennsylvania farmers spend about $7,000,000 annually for seed of the seven leading crops. There is considerable opportunity for fraud, especially in seed of the grasses and clovers. The Pure Seed Law of April 29, 1913, has effected much improvement in the quality of seeds, particularly of the grasses and clovers. This law was based on the results of an investigation conducted in 1900 by George C. Butz. He found that much inferior seed was being sold at that time. A sample of red clover which sold for $6.25 a bushel had only seventy-four per cent of seed that would germinate, and contained 2,500 weed seeds a pound; whereas another sample which sold for $6.60 a bushel had ninety-four per cent of viable seed and practically no weeds. Different samples of Kentucky blue-grass cost from $3.75 to $71.43 a bushel of germinable seed.[2]

The Pure Seed Law established standards of purity and viability and provided for testing samples of seed exposed for sale. Samples that contained more than three per cent by weight of seeds of certain noxious weeds, as wild onion or garlic, devil's paint brush, bindweed, sow thistle, and horse nettle, could not be sold; even more stringent measures were enforced against Canada thistle and dodder. Seedsmen were required to attach a tag to all packages containing ten pounds of seeds or more, stating the guarantee of purity and viability. Much of the former heavy loss from seed of low germination and containing weeds now is avoided.

Canada thistle long has been a special object of execration by farmers. It was introduced into America from Europe in timothy seed. "It first came into this neighborhood," said a New Castle County, Delaware, farmer, in 1841, "in a cargo of timothy seed from the northern part of New York, where it has so completely taken possession of some sections, that the land is almost worthless. Many abandon their farms altogether, finding it impossible to reap the wheat. . . . It is next to impossible to destroy it."[3] The pest spread rapidly throughout the southeastern counties. In 1860 a Lancaster County farmer warned, "Let our Pennsylvania farmers take warning by the experience of New York, with the worst of all weed pests, the Canada thistle. . . . It has already secured a foothold . . . and . . . unless some determined steps are taken, our whole State will be overrun with it."[4]

In 1861 the General Assembly passed a law providing that any farmer who allowed Canada thistle to ripen seeds on his premises should be liable to a fine of ten dollars; and that any farmer who feared the spread of Canada thistles upon his premises from the farm of a careless neighbor might enter the farm to destroy them.[5] Similar legislation was proposed to prevent the spread of white daisy, which had taken possession of many old meadows by 1860. It was found, however, that self-interest is more effective in such matters than legislation. Rising standards of farm practice, together with the efficient operation of the pure seed law, have effected much improvement.

PROGRESS IN CORN CULTURE

Next to hay and grass, corn is the foremost feed crop of the State. Pennsylvania led all states in corn production until 1830; then the upper Mississippi valley became the "corn belt" of the nation. Prior to 1900 wheat was the most valuable crop of the State in most years; since then corn has taken precedence; in some years it is worth more than double the value of the wheat crop. This is due partly to a considerable increase in acreage—from 986,000 acres in 1870 to a peak of 1,581,000 acres in 1919—but also to an increase in average acre yield, from thirty-five bushels for the period 1870-1880 to a present average of around forty-two bushels. The highest average yield recorded for any year was fifty-one bushels, in 1825; the average for the United States that year was twenty-eight bushels. Over ninety per cent of the corn is fed on the farm on which it was raised.

Since 1900 there has been a marked change in the method of utilizing corn. Previously it was fed almost wholly as ripened grain and dry stover; thereafter a constantly increasing proportion was fed as silage. In 1940 over seventeen per cent of the corn grown was harvested for silage; in some of the northern counties, practically all. The silo extended the area of profitable corn production to the northern tier of counties and to high altitudes in central Pennsylvania. In those sections corn does not fully mature but ripens sufficiently for use as ensilage, in which the stalk and leaves are almost as important as the grain. The corn belt of Pennsylvania, however, is the nine southeastern counties of Adams, Berks, Bucks, Chester, Cumberland, Franklin, Lancaster, Lebanon, Montgomery, and York. These account for more than two-thirds of the increase in production since 1840.

The economics of corn growing in south-central Pennsylvania in 1852 was set forth by a Blair County farmer: "One of our principal crops is Indian corn. . . . I submit herewith a statement of the cost and profit per acre of cultivating corn in this vicinity, estimating fifty bushels as the average yield.

Interest on land, at fifty dollars per acre,	$3.00
Manure hauling and spreading,	2.00
Breaking sod,	1.50
Harrowing,	.50
Marking out and planting seed,	.80
After culture,	1.25
Husking and hauling to market,	2.00
	$11.05

"The whole cost of producing 50 bushels is eleven dollars and five cents, or twenty-two cents per bushel. We get forty cents per bushel for it very readily, leaving a balance of nine dollars, clear profit, per acre."[6]

A common method of culture at that time was to plow manured sod and plant by hand in rows three feet apart north and south and furrowed four feet apart the other way, with hills two feet long, having from six to eight stalks to the hill. Corn was "plowed out," not cultivated. Some farmers dropped half a handful of ashes or lime or a pinch of land plaster on each hill at the first hoeing. In the southeastern counties the prevailing method of harvesting was to cut off the stalks knee high and shock them in the field for hand husking later. In a few of the central counties, which had a shorter growing season, "topping" was customary. The tops were cut off a few inches above the ear after the grain had reached a certain degree of ripeness, bound into bundles, dried, and stored for winter feeding, leaving the ears to ripen on the bare stalks.

To prevent birds and rodents from pulling up corn, and to stimulate its growth, the seed sometimes was soaked for ten to twenty hours before planting in a weak solution of saltpeter. This was an ancient Old World practice; the *Georgics* of Virgil note:

"Some steep their seed and some in caldrons boil
With vig'rous nitre and with lees of oil."[7]

Tar might be added to this brew. According to Cornelius Weygandt, as late as 1880 some German farmers made a great "king hill" in one corner of the field. This was a mound of soil about four feet wide and a foot high. It was thickly planted with corn, perhaps a quarter of a peck, and some kernels were sprinkled on top as bait for crows, blackbirds, and squirrels.[8] The hope was that they would confine their depredations to the king hill. Usually this hope was vain.

While the average yield was low—about thirty bushels of shelled corn an acre—some very creditable records were made, especially on new ground and river bottom land. In 1846 Samuel J. Dickey and brothers of Hopewell, Chester County, raised "3,292 bushels of shelled corn on forty acres and twenty-eight perches, averaging 82 bushels to the acre."[9] In 1854 the State Agricultural Society awarded a premium to George Drayton of Delaware County who "produced from five acres of ground in one continuous piece, accurately measured by a surveyor . . ., five hundred and eight and one-fourth bushels of shelled corn, . . . as ascertained by actual measurement."[10] Even larger yelds were recorded occasionally in interior counties. In 1853 Benjamin Covert of Fayette County raised 158 bushels and seven quarts of shelled corn on one acre of land, "and of this very extraordinary product he produces the required proof by actual measurement."[11] In 1852 George Walker of Susquehanna County "produced . . . one hundred and sixty bushels of shelled corn per acre, on five acres, and twenty tons of superior pumpkins."[12] This field was surveyed and the yield attested by a committee of the State Agricultural Society.

The record yields of early days were not computed on the basis of 15½ per cent moisture content and fifty-six pounds to the bushel, as they are today; nevertheless they compare favorably with the record crop of 1948, a yield of 174.5 bushels of shelled corn, produced by Philip A. Hyatt of Chester County.[13]

About 1850 there was a controversy in farm journals concerning the relative feeding value of white and yellow corn. Most farmers were of the opinion that yellow corn was more nutritious and better for stock. Agricultural chemists scoffed at the idea, but the farmers were right. Their contention was confirmed in 1922 by the experiments of Steenbach at the University of Wisconsin, which showed that yellow corn contains a larger amount of carrotene or fat-soluble vitamins.

CORN BREEDING

No other farm crop has responded more effectively to breeding. Before 1900 some improvement in corn had been accomplished, mainly by field selection. Between 1890 and 1910 there was much interest in the improvement of the physical appearance of the ear. The aim was to produce an ear eight to twelve inches long, cylindrical, with perfectly filled tips and butts, small cob, and straight, close rows of deep, wedge-shaped kernels; the ear to shell from eighty-five to ninety per cent corn. Little consideration was given to the more important factors of high yield, disease resistance, stiffness of stalk, and quality of the kernel. Community, state-wide, and national corn shows, in which hundreds or thousands of shapely ears competed for prizes, were the rage. In 1910 the State Board of Agriculture reported, "Movements have been started in many sections of the State by Farmers' Organizations, Corn Growers' Associations, Boys' Corn Clubs, . . . etc., for improving and increasing the yield of corn. . . . The State Livestock Breeders' Association again held its annual corn show in connection with the meeting of the State Board of Agriculture."[14] The State-wide corn show developed into the present Farm Show.

Breeding hybrid corn

Much of the corn-show effort of that time was as fruitless as judging the productive qualities of a dairy cow solely by her shape, yet it was not without value. It directed the attention of farmers to the susceptibility of corn to improvement by breeding and to the superiority of what was then called "purebred seed." It led many to select seed corn from the field rather than from the crib, and on the basis of desirable plant characters rather than by shape of ears alone. "At the present price of corn," said F. D. Gardner in 1909, "ten kernels added to each ear produced in Pennsylvania would add to the pocket-books of the Keystone State farmers $780,000.00. . . . By a little attention to the selection and breeding of seed corn, the crop can be increased by this amount."[15] Farmers were encouraged to make "rag doll" tests of the viability of seed corn before planting.

In 1896 Cyril G. Hopkins, of the University of Illinois, began his epoch-making experiments on the chemistry of the corn kernel. He showed that it was possible to increase the protein, starch, and oil content of the kernel, respectively, by selective breeding. By 1930 the ten-ear corn show was nearing the end of its usefulness. Thereafter corn breeding was mostly in the hands of professionals who applied the Mendelian laws of heredity in breeding varieties and strains that were not merely symmetrical in ear and kernel but also possessed the more fundamental qualities of high yield, disease resistance, and adaptation to specific soil and climatic conditions. Farmers then transferred their interest from the corn show to field demonstrations.

The most significant application of corn breeding in recent years is hybrid seed corn; this has been responsible for much of the marked increase in average yields. Hybrid seed corn was first sold commercially by Funk Brothers of Illinois in 1916. Within seven years it had practically superseded open-pollinated seed corn in the Corn Belt. Hybrid corn is produced by crossing or double crossing strains that have been inbred for a number of generations. The usual result is increased vigor, higher yields, and stiffer stalks, so that there is less lodging in storms.

Pennsylvania was slow to adopt hybrid corn. After 1935 a few farmers tested hybrids that had been developed in the Corn Belt, but with variable success; most of these required a longer growing season than is found in any part of the State except the southeastern counties. Seeking to secure short-season hybrids that would be adapted to conditions in other parts of the State, the Pennsylvania Agricultural Experiment Station began in 1908 to develop pure lines or inbred strains by self-pollination for subsequent use in crossing.[16] This research did not begin to come to fruition until after 1940.

Meanwhile interest in hybrid seed corn increased throughout the State, especially in the southeastern counties, to which some of the corn belt hybrids were adapted. Said *Pennsylvania Grange News* in 1939, "Interest in hybrid corn on the part of farmers in Southeastern Pennsylvania counties was quickened after the severe storm . . . on August 19th, [1939, which] blew down much of the corn in this area.

. . . Most hybrid corn, planted on rather a small scale this past year, managed to stand up when most of the open pollenated varieties were whipped down badly."[17] Hybrids usually outyielded open-pollinated varieties by fifteen to twenty per cent and were less injured by drought, insects, and diseases. By 1940 about half of the corn planted in the southeastern counties was hybrid; the breeding of short-season hybrids adapted for culture in the remainder of the State was a later development.

Corn is more free from serious insect pests and diseases than most other field crops, but it had its time of peril between 1920 and 1930, when the imported European corn borer swept over the State. In 1919 one borer was discovered on an island in Lake Erie. By 1925 more than 30,000 square miles of the nation were infested. In that year forty per cent of the sweet corn and twenty-five per cent of the field corn in Erie County was totally destroyed. By 1926 it had spread over half of the State, and farmers, especially in the southeastern counties, were jittery. From 1927 to 1931 the State and federal governments imposed a rigid quarantine on the infested area. Clean-up control measures, such as low cutting, plowing under infested stalks, and ensiling, were put into effect. These practices, together with the multiplication of natural parasites and an unusually severe winter, greatly reduced their numbers. By 1940 the borer was no longer feared, except in the southeastern counties where there are two broods a year.

With the advent of the mechanical corn picker, much of the drudgery of husking corn in the field was removed. The entire stalk is left to plow or disk under. Corn stover is not fed for roughage as much as it was a few decades ago before hay and alfalfa were as abundant as they are now. Harvesting corn by hogging it down, as commonly practiced in the corn belt, seldom is practiced in this State.

SMALL GRAINS

All the small grains except wheat are commonly fed on the farm. Of these, oats are the most important. Like wheat, this crop has declined in production, particularly since 1900 when motors began to displace horses. The reduction was from 1,051,000 acres in 1870 to 842,000 acres in 1940.[18] Most of the decrease was in the southeastern counties, where the climate is not as favorable for oats as in the cooler and more moist counties of northern and western Pennsylvania. Lancaster County now produces only about one-third as much as it did in 1840. On the other hand, ten northern and western counties have increased their average yearly production over 4,000,000 bushels since 1880. In the southeast, oats frequently are replaced in the rotation by potatoes, wheat, corn for silage, tobacco, or soybeans for hay. In the cooler parts of the State wheat commonly is omitted from the rotation and oats used as the nurse crop for grass.

Somerset, Crawford, and Bradford counties led in oats production in 1940. The average acre yield has increased less with oats than with other small grains—from thirty-one bushels in 1870 to thirty-five bushels in 1940. In 1853 it was recorded, "100 bushels [of oats an acre] has been gathered from new land; that is, where the trees have been cut, burnt, the seed sown among the stumps, and scratched in with a harrow."[19]

In early colonial days rye was a close competitor of, and substitute for, wheat; now it is a negligible factor in Pennsylvania husbandry. In 1840 the State produced 6,614,000 bushels, or one-third the total rye crop of the nation. Rye bread was a staple food on the farm. As more dependable varieties of wheat were developed, the rye acreage fell off, from 336,000 acres in 1890 to 58,000 acres in 1940. Rye now is grown for grain only under exceptional conditions, mainly on poor, slaty soils and where it is difficult to seed wheat soon enough. Sometimes it is used as a cover crop or for green manuring. The average yield, sixteen bushels an acre, is considerably less than that of wheat, and the price is lower. Practically all the little rye raised now is fed on the farm, and the straw is used for bedding. Only a small quantity of the grain now is sold to distillers, who formerly absorbed a large proportion of the crop; but not for the reason given by a Vermont correspondent to the United States Patent Office in 1849: "The praiseworthy and philanthropic spirit of the age having banished the *spirits* formerly extracted from this grain." (*Report,* Part II, 86.)

Before 1890 barley was grown chiefly for making beer. In 1852 the brewers of Philadelphia published an "Address to the Farmers of Pennsylvania," urging them to grow more barley. They stated, "Within the county of Philadelphia, there is annually consumed for the purposes of Brewing, about *six hundred thousand bushels of Barley,* supplied from the State of New York, which has sold in Albany, its general depot, the past three years at an average price of from *seventy-five to ninety cents per bushel.* . . . About equal quantities of the two and four-row are used, and the so-called spring barley is much preferred to the winter grain."[20] This appeal fell on responsive ears; by 1867 there were 30,000 acres in the State, mostly spring-sown. After 1880 the acreage declined rapidly; in 1900 only 7,800 acres were grown.

Beginning about 1930 there was a spectacular upward trend in barley production, to 155,000 acres in 1940. Practically all this increase was winter barley in the southeastern counties, where it often replaces part of the wheat acreage. Barley is not as hardy as wheat and is not dependable except in the southeast. Practically all the grain is fed on the farm; it is a better feed crop than wheat. The acre yield averages over thirty bushels, and yields up to seventy bushels have been reported. In 1854 the State Agricultural Society awarded a premium to James Sampson of Erie County "for having produced three hundred and thirty-four and a-half bushels of barley . . . upon a field containing seven acres and ninety-six perches, being a yield of forty-three and one-eighth bushels per acre."[21]

Buckwheat production is confined mainly to the northern and western counties. In 1940 Crawford, Erie, and Bradford counties led in production; about forty per cent of the total grain area of Bradford County was buckwheat. It is a short season crop, maturing in about ten weeks, and is tolerant of rather poor and acid soils that are too wet for early planting to corn or oats. The peak of production was reached in 1910, when there were 292,000 acres; by 1940 this had declined to 119,000 acres. One reason for the decline was the difficulty in harvesting buckwheat with the grain binder. The average acre yield has increased markedly, from ten bushels in 1884 to eighteen in 1940. Buckwheat is fed on the farm, mainly to poultry and cattle, but a considerable proportion of the crop still is the basis for that delectable breakfast food combination, buckwheat cakes and maple syrup.

HAY

As might be expected of a great dairy state, grass is the premier crop of Pennsylvania. Grass for hay and pasture is the mainstay of Pennsylvania agriculture. Only once in the half century from 1880 to 1930 was the value of the hay crop exceeded by that of any other crop. The production of hay has almost tripled since 1840—from 1,312,000 tons to 3,410,000 tons in 1940. This has resulted more from an increase in average yield than from an increase in acreage; the average acre yield has increased from 1.2 tons in 1860 to 1.45 tons in 1940.

Hay is the key crop in the standard Pennsylvania rotation of corn, oats, wheat, and grass. It is produced on more than ninety per cent of Pennsylvania farms, but is particularly valued in those northern counties where corn production, except for silage, is hazardous. Lancaster, Bradford, and Crawford counties led in hay production in 1940. In that year more than three-fourths of the crop land of Wayne County was in hay, and the same was true of several other northern counties.

Before motor power supplanted horse power, many farms, especially those near cities, made a specialty of market hay. During the year from October, 1845, to September, 1846, it was recorded that 12,225 tons of hay were sold in the Farmers' Hay and Straw Market, Philadelphia.[22] Much of this was grown on irrigated meadows near

Philadelphia, water being diverted upon them from a near-by stream. Such land was kept continuously in grass. In 1847 the *Farmers' Cabinet* reported, "Isaac W. Roberts, Esq., of Lower Merion, [Montgomery County,] . . . has a field in grass, which has not been ploughed for nearly a quarter of a century, and which he considers the most profitable on his place."[23] In 1851 it was stated that dairying was not carried on in Philadelphia County as much as formerly because "most farmers consider it more profitable to sell hay."[24]

Some farms were devoted almost entirely to the production of market hay. In 1856 a Schuylkill County farmer related, "The best paying crop here is timothy hay. My mode of keeping my farm perpetually in hay is to mow it four or five years . . . and then plow the field and re-seed it to timothy in August. The next year it will produce about one ton, worth $26; the second season about two and a half tons, or $65 an acre. The expense of mowing, making, hauling to market and interest on the land is $23, leaving a net profit of $42 an acre."[25] This is an appealing picture, but nothing is said of the fertility sold from the farm in the hay; eventually this would deplete the soil.

After motor power began to displace horse power, about 1915, there was a marked reduction in the acreage of timothy hay and a corresponding increase in the acreage of mixed timothy and clover, clover alone, and alfalfa. In those northern and western counties which had been selling market hay, as Bradford and Crawford, the adjustment was mainly to dairying; the acreage of hay was not reduced, but the crop was fed on the farm instead of being sold. Mixed timothy and red clover are still the most important class of hay—1,684,000 acres in 1940, or more than half the total hay acreage. The trend toward the production of more leguminous hay, which began about 1915, still continues. After 1900 red clover hay alone, which heretofore had been considered the most desirable roughage for livestock, was largely displaced by corn silage and alfalfa. There was a corresponding decline in the production of clover seed made from the second cutting; between 1920 and 1925 production declined more than one half.

From 1915 to 1925 there was some interest in the culture of sweet clover for hay. It was easier to secure a stand of it than of alfalfa, but livestock did not like it as well; it was soon abandoned save as an occasional green manuring crop.

Modern implements of hay making, as the tractor mower, side-delivery rake, loader, and pick-up baler, have greatly lessened the cost and obviated much of the arduous manual labor of earlier years. The hazard of the weather, however, still remains. According to the Pennsylvania Agricultural Experiment Station in 1935, "In spite of the best known practices, hay-making in Pennsylvania is a gamble with the weather. Much hay remains out two nights, even in fairly good drying weather, and is wet by dews. A considerable amount is rained on and requires extra handling. The result is that nutrients are leached out, leaves (the most valuable part of the hay) are lost and the quality of the hay is highly variable." To meet this situation, artificial drying or dehydration of fresh-cut hay in mechanical dryers was tried about 1930. It was effective, but too expensive except for making alfalfa meal. The trend of recent developments is to partially dry hay in the field and to complete the process in the barn by blowing air through it in the mow; or to store it in metal "hay keepers"—round, silo-like structures with ventilator slates, through which air is blown. This method, also, is expensive.

The high cost of dehydration gave impetus to the practice of putting the first cuttings of grass and legumes into the silo. This has proved to be a practicable solution of the hay-curing problem on many dairy farms. Grass silage, preserved with molasses or corn meal, or by the wilting process, is an excellent succulent feed. It enables the farmer to be more independent of the weather in harvesting the hay crop and furnishes a feed that is richer in carrotene than dry hay. Grass silage is especially valued in midsummer, when pasture grass often is short.

ALFALFA

In colonial days there were a few enthusiastic advocates of that ancient crop, lucerne (alfalfa), but usually the results were disappointing. It was fickle; a few fields produced well for a time, but most of the seedings failed utterly. The plants were yellowish, sickly, and soon perished. Inoculation of the soil with the nodule-forming bacteria was not practiced, and liming to neutralize soil acidity was not common. So lucerne dropped from cultivation.

About 1875 alfalfa was grown with marked success in California, from homegrown seed. From there its culture spread eastward; by 1885 there was a revival of interest in Pennsylvania. Again, however, the results were disappointing. In 1896 Secretary Edge of the State Board of Agriculture said, "The average experiment with alfalfa in this State has not been a success, and I do not know of any plots which can be made to . . . yield one-fourth as much as common clover would have done with the same care and manure."[26]

One reason for the general failure of alfalfa at that time, especially in the northern counties, was the lack of hardy varieties adapted to Pennsylvania conditions, such as Grimm, a popular variety of today. The main reasons, however, were lack of liming and lack of inoculation. Even the Pennsylvania Agricultural Experiment Station failed, at first, to discern the paramount need of alfalfa for lime. It reported, "In no case was lime applied to alfalfa to advantage."[27] At the annual meeting of the Livestock Breeders' Association in 1908, out of 250 farmers present only five were raising alfalfa successfully, while seventeen had tried it without success. At that time Thomas F. Hunt, Dean of the School of Agriculture, appraised alfalfa raising in Pennsylvania as being much like gold mining—there are many attempts and only a few successes.

It remained for two highly regarded Farmers' Institute lecturers from Ohio—"Joe Wing, the Apostle of alfalfa culture," and Alva Agee —to give impetus to the culture of this crop in Pennsylvania. Joe Wing's enthusiasm for alfalfa was contagious. Moreover, he advocated those practices that meet the basic requirements for success—a rich, well-drained soil, heavily limed and fertilized; inoculation with soil from an old alfalfa field; and seeding with hardy varieties. The area in alfalfa increased from fifty-two acres in 1900 to 30,000 in 1920, and to 252,000 acres in 1940. Interest in this crop was stimulated by the severe drought of 1930, when the ability of alfalfa to thrive in dry weather, because of its long tap root, was obvious. It also reduced the cost of producing milk because of its high protein content.

Alfalfa now is produced throughout the State on many soil types but mainly on limestone and other well-drained soils. It is grown not only in a pure stand but also mixed with grass and clover, in which case the hay cures more easily than in pure stands. The average yield in 1940 was 2.6 tons an acre, which was nearly twice the average yield of timothy and clover hay, and it is more nutritious.

John B. R. Dickey states the advantages of growing alfalfa in this state: "Pennsylvania farmers are primarily dairymen or livestock feeders. One of their problems is to grow sufficient protein feed to balance home-grown carbohydrate feeds, as corn, oats, silage, fodder and timothy hay. If the protein is not home-raised it must be purchased in the form of expensive concentrates. Alfalfa is an efficient producer of protein. It will yield at least fifty per cent more hay per acre than red clover and is higher in protein. It also is rich in the minerals—lime and phosphorus—that are especially needed to promote the growth of young stock. Furthermore, a stand of alfalfa lasts from two to four years as compared with one to two years for red clover. When plowed under an alfalfa sod adds more to the fertility of the soil than a timothy or red clover sod."[28]

One of the greatest difficulties in alfalfa culture in early days was to cure the hay properly. "Climatic conditions [in Pennsylvania] during the month of June," said the Pennsylvania Agricultural Experiment Station, "are not favorable for the making of a good grade of alfalfa hay. Three or four consecutive days of low humidity, bright sunshine and good air circulation are rare. The weather chart for the central Pennsylvania district shows an average of but 14 fair days in the month of June over the 10-year period, 1930 to 1940. . . . These conditions are favorable to good pastures but not to the making of hay at the proper time or in the proper manner."[29]

Since 1935 this difficulty has been overcome by many farmers by making the first cutting of alfalfa into silage, molasses or phosphoric acid being added to secure the proper fermentation. The Experiment Station reports, "A survey . . . indicated that less than 100 farmers in the state stored grasses, legumes, or some kind of crop other than corn in silos in the summer of 1935. A similar check-up revealed that between 2 and 3 thousand carried out the practice in the summer of 1940."[30]

Another method of avoiding the hazards of field curing is dehydration. This is used by only a few growers or processors who have a large acreage. In the vicinity of Nazareth, Northampton County, is the most intensive alfalfa-growing district in the East, comprising thousands of acres. Here are located large driers, each handling the product of 2,000 to 3,000 acres. These are operated on an industrial, not on a farm, basis. Green alfalfa purchased from farmers is shredded, dried, ground, and bagged. These driers can turn out about thirty tons of alfalfa meal a day; this meal contains about seventeen per cent protein and is valued as feed, especially for chickens.

PASTURE

The most outstanding recent trend in crop husbandry is that toward grassland farming, particularly the much greater emphasis that is placed on pasture improvement through fertilization. Until about 1915 most pastures were sadly neglected and produced but a fraction of their potential yield of herbage. There were, however, a few exceptions.

From 1830 until 1870 the pastures of Chester, Delaware, and parts of adjacent counties had a national reputation for excellence under a system of farming which centered around the fattening of beef cattle on grass. "The *quality* of the pastures [in Chester County] is almost unrivalled," claimed the *Pennsylvania Farm Journal* in 1854. "The Green Grass *(Poa Pratensis)*, grows *naturally* on our soils. . . . The larger part [of the grazing farms] is retained in this kind of grass, for periods of from 10 to 30 years, without requiring to be ploughed, and rather improving in value yearly. The sod becomes so firm, . . . that everything else is smothered out, and the green grass, and white clover sometimes with it, have entire possession. Once in a few years these fields receive a top dressing of lime, about 50 bushels to the acre, and an occasional dressing of plaster . . ., which is all they require."[31] According to *Evans' Rural Economist* in 1861, "Green Grass having become completely naturalized to this soil and climate (Chester County) it will eventually, in a well-prepared field, get possession without the application of any seed and to the exclusion of timothy and red clover, the seed of which has been sown. In our best Brandywine lands Green Grass and white clover will retain possession for forty or fifty years, or even longer."[32]

For many years pastures of "green grass," now known as Kentucky blue grass, were the pride of southeastern Pennsylvania. In 1847 the editor of *Farmers' Cabinet* boasted, "The hereditary reputation and superior quality of the Philadelphia butter . . . is also due to the very ancient pastures, well set with green grass and white clover . . . [and] sweet vernal grass. Land [near Philadelphia] in permanent grass, from the cheapness with which it can be kept up, requiring only at long intervals a top-dressing of lime and plaster, may be considered as in a condition more profitable, than under any description of tillage performed by hired labour. The more ancient the sod of grass, the better is it relished by the cattle, and the more productive is it in milk and butter . . . ."[33] When competition from the West disrupted the beef cattle industry near Philadelphia many of these superior pastures fell into neglect until rescued by dairying.

Most pastures in other parts of the State, except in Washington and Greene counties, were poor indeed. On the agricultural frontier livestock continued to run in the woods, as in colonial days. In 1853 it was reported from Potter County, "Our woods pasture is excellent and certain; in fact, a large majority of the settlers allow their cattle to depend entirely upon it, until driven in by the first snows of winter, without fear of their losing flesh or being in bad condition for wintering."[34] After land had been cleared, most so-called pastures were merely exhausted old fields. "Of what manner of fields are our pastures?" asked a Crawford County farmer, rhetorically, in 1876. "Are they not the ghostly ruins of such meadows as I have described? The clover and timothy gone, save here and there a straggling spear of the latter, and in their place a sparse growth of natural grass, red top, June grass and the like are having a lively contest with the wild grass and those wandering Arabs of our fields, [plantain, dandelion, dock, daisy and the whole family of tramps]."[35]

There was not much pasture improvement until after 1915. Thomas F. Hunt was one of the first to discern the heavy loss from this neglect. In 1909 he said, "I believe it safe to assert that the same money used in applying chemical fertilizers to grass lands will bring a greater profit than when applied for corn or wheat."[36] In 1916 the Pennsylvania Agricultural Experiment Station began experiments in pasture fertilization on Dekalb, Volusia, and Westmoreland soils. In 1925 it announced, "Immature Kentucky blue grass . . . excels in nutritive value all other eastern pasture grasses. In fact, it contains a higher percentage of digestible protein than either red clover or alfalfa. . . . A well-fertilized blue grass pasture is capable of furnishing three times the digestible crude protein supplied by a four-year rotation of corn, oats, wheat, and grass.[37] In 1916 the Agricultural Extension Service began pasture improvement demonstrations in different parts of the State.

After 1920 there was a revival of interest in permanent pastures, as distinct from old sods, in a rotation. Greater attention was given to improvement practices, especially periodic applications of lime and superphosphate. Ladino clover, a giant type of white clover, sometimes was added to the traditional pasture mixture of blue grass and white clover, but this remained the most popular pasture mixture, as it had been a century earlier. The establishment of the federal Regional Laboratory for Pasture Research at The Pennsylvania State College in 1935 gave further impetus to pasture improvement in this State.

By 1940 there were about 2,000,000 acres of plowable pasture in Pennsylvania, and a still larger acreage of rough and woodland pasture, over 4,500,000 acres in all. This was about one-third of the so-called improved farm land. The highest proportion of land in permanent pasture, from forty to fifty per cent, was in Washington and Greene counties and in the northern tier of counties where dairying dominates the farm economy. The lowest was in the southeastern counties, particularly on the most fertile and most high-priced land, where farms are small. In the Old Order Amish community of Lancaster County, where the average size of farms is forty-six acres, about forty acres are in crops that are harvested by men rather than by livestock, and only six in pasture, mostly along water courses where the land is too wet to plow. Greene and Washington counties are famous for their bluegrass pastures as they were a century ago.

That there still is much room for pasture improvement is indicated by the fact that in 1940 an average of approximately four acres was required for each animal unit, whereas one acre of good pasture should suffice. If a dairy cow has to hunt over four acres or more for the eighty pounds of green grass she requires daily, her milk production is bound to be reduced. Sixty per cent of the animals grazing on Pennsylvania pastures in 1940 were dairy cows, thirty-four per cent were other cattle, and six per cent were sheep.

MINOR FEED CROPS

From time to time certain other feed crops have bid for a place in Pennsylvania agriculture. Chief of these are sorghum, sugar beets, and soy beans. Of these, only soy beans show promise of becoming firmly established.

The culture of sorghum, then known as "guinea corn," was first urged by John Lorain of Philipsburg in 1810. In 1853 William R. Prince, a nurseryman of Long Island, New York, imported some seed and distributed it under the name, "Chinese sugar cane." Wider distribution occurred in 1856, when the Bureau of Agriculture of the United States Patent Office imported a large quantity of seed, and the *American Agriculturist* sent out 25,000 packages to farmers all over the country. The price of sugar was very high at that time; it was hoped that sorghum would make it possible for farmers to produce enough sugar for home use, at least. This hope was doomed to disappointment. Sorghum culture met with general favor in the southern and southwestern states as a means of producing syrup for family use, but it was not profitable for making sugar.

Between 1861 and 1866 sorghum, or "northern sugar cane," was grown to some extent in this State for making syrup, since the Civil War had cut off the supply of cane sugar from the South. In 1862 the editor of *Farmer and Gardener* wrote, "Although experiments with sorghum in southeastern Pennsylvania during the past three years were attended with marked success, the crop soon fell into disfavor. Now, however, since sugar has risen to double its usual price and syrup and molasses command extravagant prices, sorghum promises to remunerate the Pennsylvania farmer well." In 1854 it was reported, "Mr. Elwood Smedley of Willistown, Chester County, got as the product of his sorghum crop fifty-five gallons of molasses. At the manufacturers at New London and Londongrove a large quantity of molasses has been made." With the return of low prices for cane sugar, sorghum culture was discontinued; it could not compete with sugar cane. The high point in production was reached in 1869, when 213,000 gallons of syrup were made.

About 1888 there was a revival of interest in the culture of sorghum for making sugar. At a meeting of the State Board of Agriculture in January, 1889, Governor James A. Beaver stated his opinion that we might produce sugar from sorghum in Pennsylvania at a profit. He suggested that the State offer a bounty of two cents a pound, the total amount paid in any one year not to exceed $20,000. At his invitation, Dr. Peter Collier, Director of the New York State Agricultural Experiment Station, addressed the General Assembly on the subject. He suggested that sorghum sugar could be produced for about one cent a pound. The Legislature took no action, possibly because of the counsel of Secretary Thomas Edge of the State Board of Agriculture, who said, "The main difficulty in the production of sugar from sorghum is not so much in the production of large weights of cane per acre, as in the production of cane containing paying percentages of sugar."[38]

In 1900 only 105 acres of sorghum were grown; this was a decrease of seventy-five per cent from 1890. Since then sorghum of a number of types, saccharine and non-saccharine, has been grown somewhat as a supplemental forage crop. During World War I, when "no sugar" signs appeared on grocery stores, there was a brief revival of sorghum culture for syrup.

From 1830 to 1850, sugar beets were grown to some extent in the southeastern counties as a feed crop; they supplied succulence to stock during the winter. The first attempt to make beet sugar was at Philadelphia in 1830. In 1835 the Committee on Agriculture of the Senate recommended measures to encourage beet culture for sugar in Pennsylvania.[39] Nothing came of this proposal; the beets were used only for feed. In 1839 a Dauphin County farmer reported, "In the month of April last, I planted about an acre of sugar beets, for the purpose of feeding the cattle during the winter season . . . [The yield was] 1353 bushels. This will ensure me plenty of good milk and butter during the winter . . . 1353 bushels at 30 cents would make . . . $405.90."[40] In 1841 a New Oxford, Pennsylvania, farmer wrote to *The Cultivator,* "In this neighborhood, persons feeding the [sugar] beet to their cows, readily procured two cents per pound more for their butter . . . My hogs are wintered solely upon beets and kitchen slop . . . I have also fattened [beeves] solely upon sugar beets . . . 1,000 bushels [to the acre is] a moderate crop."[41]

About 1880 and continuing for twenty-five years, there was a revival of interest in the culture of sugar beets for making sugar. In 1882 Thomas J. Edge stated the situation with his usual clarity: "The close competition with the west, into which our farmers have been forced by low-priced land, and a system of low freight rates, has caused a desire for some agricultural product which could be made a specialty . . . The three new products which have . . . received the most attention . . . have been sugar from corn and sorghum, beet sugar, and silk . . . [We] believe that they will not furnish our farmers with the relief which they desire . . . because the cost will exceed the market value."[42] Enthusiasts for beet sugar, however, continued to promote the enterprise.[43]

In 1897 the Pennsylvania Agricultural Experiment Station established experimental plots of sugar beets around the State. It reported that the beets showed "a very good average of quality and give every encouragement for further investigation into the capabilities of Pennsylvania as a sugar-producing State."[44] In 1898 more than 600 farmers in the Cumberland Valley grew small plots of beets with the expectation of establishing a factory there. In some parts of the State beets analyzing eighteen per cent sugar were raised, but the average was about twelve per cent.

The main problem was economic; this was stated in 1898 by Henry P. Armsby: "The most reliable estimates place the minimum size of a successful beet sugar factory at a capacity of 300 tons of beets per day, and the cost of such a factory is estimated at not less than $200,000 . . . . All hope on the part of farmers that they can manufacture beet sugar with simple and inexpensive apparatus should be given up once for all. The question for us now is whether we can raise good sugar beets in sufficient quantity to supply a factory and at a cost which will leave an adequate profit."[45]

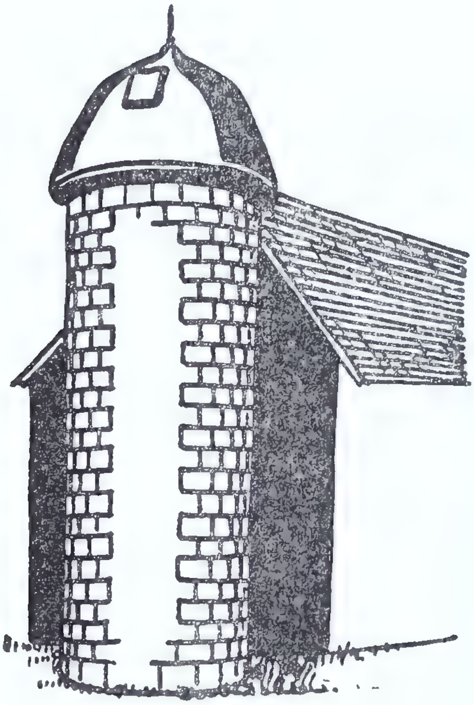
Continuing its experiments, in 1902 the Experiment Station reported: "In no case does the percentage of sugar fall below the manufacturing limit, the average amount in the cleaned, decrowned beet being 16 per cent . . . In seven cases . . . a yield of 19 tons or more is reported. The average yield of topped beets obtained from the twenty-two crops weighed, is 13.2 tons [to the acre] . . . . These results, together with those of earlier years, clearly indicate that the climate and soil of Elk county, and probably of a large part of northern Pennsylvania, are fitted for sugar-beet culture."[46]

In spite of this encouraging evidence, no factories were built. The average yield and the average sugar content were fairly satisfactory, but the cost of production was high, mainly because of the labor required for thinning and weeding. The price of beets at the factory—$40 to $60 a ton—was not sufficient to justify Pennsylvania farmers in growing this exacting crop in competition with the arid regions of the West where beets could be grown with a higher acre tonnage, and a higher sugar content, and at less cost. Dairying was more profitable here.

Soy beans were grown in Pennsylvania, experimentally, in 1846,[47] but they enlisted little interest until after 1910; then they began to find favor as a feed crop and occasionally for green manuring. The hay was cured with difficulty and the leaves shattered easily in curing. In 1920 soy beans were grown on only one farm in 200, and averaged but one acre to a farm.

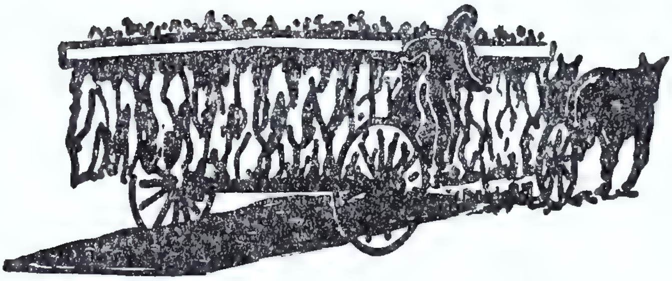
About 1938 interest in the production of soy beans for seed began to develop, especially in the south central and southeastern counties. When grown for seed soy beans usually took the place of oats in the rotation, but the crop was not harvested in time to seed wheat. By 1940 there were 90,000 acres of soy beans in the State. Most of them were grown for hay and the silo; only seventeen per cent was for seed. The use of the combine greatly facilitated harvesting the beans. In 1939 the Pennsylvania Soy Bean Association was organized; 5,000 acres were grown in Lycoming County that year for seed. A factory was established to press the oil from the beans, leaving the meal for use as stock feed, where it replaces protein derived from animal sources. The oil is used as food and in the drying oil industry.

Before the silo became established as an economical means of supplying succulence to livestock during the winter, root crops, especially the rutabaga, potato, and sugar beet, were grown considerably for this purpose. Yields of 1200 or more bushels of rutabagas to the acre were reported. In 1852 John Wilkinson of the Mount Airy Agricultural Institute, near Philadelphia, was awarded a premium by the State Agricultural Society for producing 1,017 bushels of carrots on one acre.[48] The amount of manual labor required by root crops was heavy. The silo served the same purpose at much less expense.



Silage gives full food value of corn and other forage crops

VII



Lancaster County tobacco wagon

CASH CROPS

LESS THAN one fourth of the income of Pennsylvania farmers is derived from crops sold, other than horticultural crops. Since 1900 the percentage has decreased sharply, partly because of the disappearance of market hay but mainly because of the decline in wheat production. The spectacular rise of potato culture as a specialized industry since 1920 and the considerable increase in tobacco production have offset, to some extent, the reduction in sales of wheat and hay.

Wheat Production

In 1840 Pennsylvania yielded to Ohio the distinction of being the leading wheat-producing state in the Union. It regained the crown temporarily in 1850 with a production of 150,000,000 bushels but thereafter the title of "wheat belt" of the nation, which it had shared with western New York, Maryland, and Virginia, passed to the upper Mississippi Valley. In 1850 Lancaster County led the State and nation with a production of 1,300,000 bushels. By 1860 competition from the cheap virgin lands of the West had become so keen that the question "Shall we give up growing wheat and grow grass and corn instead?" was hotly debated at Farmers' Clubs. Very wisely, it was decided to continue to grow all of these crops in a diversified agriculture centering around livestock.

Although the trend in wheat acreage has been downward—from 1,426,000 acres in 1870 to 874,000 acres in 1940—wheat still is an important cash crop; it was valued at $14,508,000 in 1940. It fits well into the prevailing rotation as a nurse crop for grass and the straw is valued for bedding. An increase in average acre yield has largely offset the decrease in acreage. This decrease was mainly in the northern and western counties, which are better suited for oats, hay, and pasture than for wheat. Production is heaviest in the southeastern counties, which also lead in corn production.

The introduction of the Mediterranean variety, about 1840, contributed largely to the decision of Pennsylvania farmers to continue to produce wheat. Previously the loss from the ravages of Hessian fly had been heavy. "The 'White Blue-stem' variety has for several years been generally cultivated and preferred," said the committee of the Centre County Agricultural Society in 1853. "Last season . . . it suffered considerably . . . from the ravages of the fly, while the Mediterranean almost wholly escaped. This circumstance induced many of our farmers last fall to sow more of the Mediterranean and less of the white blue-stem."[1] After 1870 the Fultz achieved prominence. This was developed by Abraham Fultz of Mifflin County. In 1862 he noticed three beautiful heads of smooth wheat in a field of Lancaster Red wheat. He saved the seeds and it proved more productive than the other sorts.[2] This noted variety was widely disseminated by Frederick Watts of Cumberland County, then United States Commissioner of Agriculture.

Of the forty-five varieties of wheat grown in Pennsyvania in 1920, Fulcaster comprised twenty-three per cent of the acreage and Fultz sixteen per cent. The meteoric rise of "Pennsylvania 44," or Nittany, illustrates the transient nature of wheat varieties. This was developed by selection by Charles F. Noll of The Pennsylvania State College, beginning with one superior head which he noticed in a field of Fulcaster in 1909. It was distributed in 1920. In 1925 it was estimated that approximately 100,000 acres, one fifth of the wheat acreage of the State, was of this variety.[3] In many sections it averaged five bushels an acre more than any other sort. By 1930, however, it had been mostly superseded by other varieties, except in western counties.

Practically all the wheat grown in Pennsylvania is of the winter varieties, sown in the fall. Spring or summer varieties, sown in the spring, once were grown considerably. In 1856 a Susquehanna County farmer reported, "Spring or summer wheat . . . has become an important crop in this county of late years . . . It is more to be relied on than winter wheat, unless the latter is sown on new land . . . [It] is the best crop with which to sow grass . . . The yield per acre will not fall behind winter wheat."[4] Spring wheat soon fell into disfavor. In 1863 the editor of *Farmer and Gardener* stated, "A few years since there was quite a rage amongst Pennsylvania farmers in regard to Spring wheat. The seed . . . commanded high prices . . . [But] we do not know a single farmer at this time engaged in its cultivation."[5] In 1918 there were 23,000 acres of spring wheat, but by 1927 only 8,000 acres were grown.[6] Thereafter it practically disappeared.

The average yield has increased from eleven bushels an acre in 1866 to twenty bushels in 1940. On strong soils yields of twenty-five to thirty bushels are common. "The southeastern counties as a group are making wheat history," said George F. Johnson in 1929. "To increase the total wheat production 4,000,000 bushels [between 1884 and 1924] with an increase of only 30,300 acres in area harvested, is an outstanding achievement . . . Lancaster County, for example, is producing over 500,000 more bushels now than 40 years ago with an actual reduction of 3,600 in wheat acreage. Bucks County farmers have reduced their acreage approximately 5,000 and still produce 65,000 more bushels of wheat than four decades ago."[7]

During World War I, when farmers were under strong governmental pressure to increase wheat production for export, many Pennsylvania farmers chose to accomplish this by more intensive culture rather than by breaking up the established rotation. The acreage was increased only about seven per cent, from 1,382,000 acres in 1917 to 1,480,000 acres in 1918, instead of the fifteen per cent increase requested by the Federal government.

Record yields have been reported from time to time. In 1840 a York County farmer boasted of a yield of 128 bushels of Orange Bearded and Blue Stem on three acres, or forty-two and two-thirds bushels to the acre.[8] This was exceeded in 1853, when a committee of the State Agricultural Society awarded a premium of $20 to John McCord of Bradford County "for having produced an average of fifty-one and a half bushels of white blue stem wheat per acre, upon a field containing seven acres fifty-two perches."[9] Both acreage and yield were certified by a representative of the Society. This yield was on new ground which had never been manured or fertilized.

From time to time the wheat crop has suffered heavy loss from insects and diseases. After the introduction of the Mediterranean, in 1840, it was thought that the Hessian fly, which had devastated many eastern wheat fields between 1790 and 1840, was under control. This wheat variety could be sown later than other sorts and so escaped attack. In 1842 it was asserted, "The character of the Mediterranean is now fully established [in Bucks County] . . . I could find no man who had ever seen it injured by the [Hessian] fly, and very rarely . . . by the rust."[10] In 1852 a discouraged Westmoreland County farmer gloomily reported, "My entire [wheat] crop was destroyed by it . . . There seems to be no remedy for it."[11] Even as late as 1911 the Pennsylvania Department of Agriculture observed, "The Hessian fly has destroyed from 10 to 50 per cent. of the wheat crop of the State and has, therefore, cost us millions of dollars."[12] Late seeding has largely eliminated this loss in recent years.

The black stem rust, which caused considerable loss before 1840, has been nearly brought under control by the eradication of wild barberry plants near wheat farms; these are an alternative host to the disease. For a number of years farmers held "barberry bees" to destroy the bushes; now governmental agencies do the work. In 1922 and again in 1923 it was estimated that the angoumois grain moth, which makes weevilly grain, destroyed 5,000,000 bushels each year. Thereafter it was brought under control by fumigation.

WHEAT MARKETING

This has undergone a radical change since 1840. Until about 1870 most of the crop was hauled to local mills where it was ground into flour. Thereafter the milling industry was largely transferred to Minneapolis and other mid-western cities. This development presaged the gradual extinction of small flour mills. By 1923 only 600 of the several thousand mills that had dotted the State were in operation. The introduction in 1875 of the method of making snowy white "patent" flour, by using a series of chilled iron rollers, still further placed small flour mills at a disadvantage. In 1924 more than three-fourths of Pennsylvania wheat was shipped out of the State to be milled.

In 1924 the editor of *National Stockman and Farmer* asked some pertinent questions: "Why does three-fourths of the 25,000,000 bushels of wheat produced in Pennsylvania leave the State? Why is seven-eighths of the wheat consumed in Pennsylvania shipped in? . . . Is there any essential difference in the milling qualities of soft red winter wheat grown in Pennsylvania and that grown in the mid-western states which now is used as a blend in most standard brands of flour sold in Pennsylvania? Why doesn't the average farmer's wife use flour made of Pennsylvania wheat when her mother took great pride in the bread and pastry made of flour exchanged at the local mill from wheat her husband raised?"[13] The most convincing answer to these questions is that when Pennsylvania housewives baked their own bread wheat was wheat and flour was flour.

Since 1900 most housewives have stopped baking bread because it is more economical to buy the products of commercial bakeries. The bakeries have found that blends of flour made from two or more different types of wheat make better bread than can be made from one type alone. A common blend is one half western hard spring wheat and one half soft red winter wheat such as is commonly grown in Pennsylvania. Flour made from the starchy varieties grown in this State, when milled alone, is better for the manufacture of crackers than for bread; while flour milled from high protein varieties is most useful for the manufacture of pretzels. The diversity of the varieties grown in this State is a handicap in marketing the crop; in 1923 flour made from Pennsylvania wheat alone was quoted at a discount of fifty cents to $2.00 a barrel, mainly because it was not uniform in composition.

Another reason for the prejudice of the milling industry against

Pennsylvania wheat until quite recently was that it was ungraded. The United States Grain Standards Act was passed in 1916. In 1926 the Pennsylvania Department of Agriculture reported that grading factors which had resulted in the heaviest discount on the price of 1,705 cars of Pennsylvania wheat shipped to terminal markets that year were: garlic, 60.3 per cent of the cars; excess moisture, 48.7 per cent; angoumois moth, 20.4 per cent.[14] The loss to the farmers because of moth and garlic was estimated to be $1,226,000. Only twenty-three per cent of Pennsylvania wheat graded No. 1 that year. In 1932 the loss was still higher.[15] In some years nearly fifty per cent of the wheat shipped from certain districts graded smutty. Yet this may easily be avoided by treating the seed.

After 1933 Pennsylvania lost most of the export market for wheat which it had held since early colonial days, except some red winter wheat shipped to Italy. The wheat area of southeastern and south central Pennsylvania is the only area in the East that has not capitulated to the West in the production of this crop. In 1893 Secretary Thomas J. Edge of the State Board of Agriculture wrote, "Pennsylvania wheat growers realize that if grown for the grain alone, they are losing money on every bushel of wheat produced and sold for less than sixty-five cents, and that, but for the straw which they must have for bedding and the ensuing crop of grass, which they can obtain in no other way than through the agency of the wheat crop, they had better throw the crop out of the rotation."[16] This is as true today as it was in 1893, even though the market price is much higher.

Studies by Agricultural Extension specialists, beginning in 1920, showed that the average cost of producing a bushel of wheat at that time on thirty-five representative Lancaster County farms was $1.27 a bushel. The range on the different farms was from ninety-six cents to $2.17 a bushel, according to cultural and other conditions. The figures were based on an average yield of twenty-four bushels per acre. It was concluded that "the low price received by farmers does not justify dropping it from the rotation entirely . . . It works in very well with the rotation, provides straw for livestock, . . . and in addition provides a prepared seed bed for the hay crop that usually follows."[17] It also is an important cash crop and occasionally is used to some extent as an emergency feed crop.

POTATO CULTURE, 1840-1920

The rise of the potato from the lowly "spud" of 1840, used chiefly for feeding livestock, to the leading cash crop of the State in 1940, presents many interesting contrasts. Modern commercial potato growing may be said to have begun about 1920, when spraying, the planting of disease-free seed, and other improved cultural practices came into more general use.

In 1840 and for more than half century thereafter, potatoes were grown in small acreage by general farmers, not by potato specialists. Nearly every farmer grew from one-half to three acres. In 1840 Pennsylvania produced 9,536,000 bushels, or about one-half the present average crop. Washington County led with more than half a million bushels. At that time potatoes were considered one of the most certain of crops; they yielded abundantly without special care and had no serious insect pests or diseases.

Cultural methods in 1840 were simple. The seed pieces were plowed in and the crop plowed out and then picked up by hand. Potatoes rarely were fertilized except with manure on sod. They were not sprayed. Fully as much of the crop was consumed by livestock, especially swine, as by humans. A small percentage was used for making starch, both on the farm and in factories. The prevailing market price—twelve to twenty cents a bushel—offered little inducement for expansion of production beyond the amount that could be used to advantage on the farm.

Although the average yield for the State was very low—about eighty bushels—a few high yields were recorded. In 1840 a Tioga County farmer wrote to *The Cultivator,* "From different measurements my Kidney potatoes will fairly average 600 bushels per acre." In 1859 P. Mershimer Jr. of Lawrence County reported to the State Agricultural Society "that he had raised one hundred bushels of red potatoes on one-quarter of an acre . . . This is the fourteenth successive crop of potatoes on the same ground."[18] Some of the high yields reported in early days were "at the rate of," having been calculated on an acre basis from the production of a few hills or a few square rods. In 1868 W. T. Wylie of Bellefonte, Centre County, offered a prize of $100 for the best essay on potato culture. It was won by D. A. Compton of Wayne County, and the essay was published at Bellefonte.

The easy-going and complacent potato industry of 1840 received a severe shock in 1843 with the appearance of the "potato disease" or "rot." This had been introduced from Ireland, where it had caused a nation-wide famine. It destroyed entire crops in many parts of the State. In 1843, a Chester County farmer reported to *The Cultivator,* "We in this section of country have this year been retarded in our prospects of the potatoe crop . . . by a very strange fatality which the oldest inhabitants have never before witnessed. The potatoes have been attacked by a disorder somewhat resembling the plague, generally called the rot . . . The stench that emanates from them is almost insupportable . . . Few have been saved, I suppose not above 20 per cent . . . This disease stretches its baneful influence . . . , in Pennsylvania, from near Philadelphia, westward beyond the Susquehanna river to York county . . . The causes attributed . . . are variableness of season, long and frequent heavy rains, with intervals of extreme hot sun."[19]

The cause of the potato disease was the subject of wide speculation. In 1847 the editor of *Farmers' Cabinet* of Philadelphia reported the opinion "that this terrible disease was one of those inscrutable dispensations of Providence, sent in its wisdom."[20] A prominent chemist was more explicit though hardly more illuminating. "The cause of the disease is the same which, in the spring and autumn, excites influenza; that is, the disease is the effect of the temperature and hygrometric state of the atmosphere, by which, in consequence of the disturbance of the normal transpiration, a check is suddenly, or for a considerable time, given to the motion of the fluids, which is one chief condition of life."[21]

Many other theories as to the cause of the disease were advanced, such as excessive growth, deterioration of seed, superabundance of moisture, imperfect assimilation, "something in the atmosphere." Many supposedly infallible remedies were proposed, such as dusting the vines with ground charcoal or a mixture of Scotch snuff, land plaster, and lime, or sprinkling them with a decoction of tansy leaves. A sapient correspondent of *Farmer and Gardener* in 1860 announced, "Over-stimulation is the cause of the potato disease. We do not say that this intoxication of the soil is always the result of the excessive use of artificial fertilizers, because it may be produced by natural causes, such as a redundance of moisture and heat. Hot sunshine after repeated showers is a most violent stimulant . . . The effect of this stimulation is to enervate the vitality of the potato."[22]

None of the remedies suggested was effective. By 1850 the blight was prevalent in all sections of the State. Average acre production was cut more than half; sometimes the crop was utterly destroyed. The grower's loss was mitigated to some extent by an increase in price, from twenty to forty cents a bushel.

After 1870 there was a larger market outlet for potatoes for human consumption, partly because many potato-loving Irish came to our shores. The acreage increased in spite of the blight. Then, as now, Lehigh County was prominent in commercial potato production, but there were a number of important shipping centers in other parts of the state, notably in Erie County. In 1879 it was stated, "Farmers, probably, raise more potatoes along the Lake shore than in any one section of the United States. It is not uncommon for a farmer to have fifty acres in potatoes. Sometimes it runs up into the hundreds; but it is more usual to find farmers having from ten to twenty acres . . . During the shipping season it is not an uncommon thing for from ten to twelve car loads to be shipped from our station [Girard] in a single day . . . They send them all over the United States."[23] In 1891 many thousands of bushels were shipped from Lehigh and northern Berks counties to Ireland, where the blight still raged. The publication of T. B. Terry's book on potato culture, in 1885, aroused much interest in the culture of this crop.

Blight continued to take heavy toll periodically, especially in the northern counties, until after 1920. The first experiments with the Bordeaux spray were made in 1891, when H. C. Snavely of Lebanon County and several others reported moderate success with this practice.[24] The Secretary of the State Board of Agriculture reported, "During the past season . . . experimentors have attained the greatest degree of success by the use of liquid applications . . . composed of four and one-half pounds sulphate of copper, three and one-half pounds of quicklime and twenty-two gallons of water, . . . known as 'bouillie bordelaise' mixture . . . The liquid is applied with small pumps called 'pulverizers,' so constructed as to deliver it in the form of a very fine spray to all parts of the plant."[25] Very few growers, however, sprayed with Bordeaux until after 1920.

The darkest year for Pennsylvania potato growers, next to the blight year of 1843, was in 1872 when the Colorado potato beetle invaded the State. It is difficult for the present generation to visualize the stark consternation of farmers of that period when they read the portentous statement of S. S. Rathvon, Entomologist of the State Agricultural Society, issued on July 4, 1872, and entitled "Colorado Potato Beetle." He solemnly announced, "The unpleasant duty devolves upon me of proclaiming that the notorious 'Colorado Potato Beetle' . . . is at last domicilated in the Susquehanna valley, in Lancaster County . . . I have not heard of them being in any other part of Pennsylvania . . . [It is] one of the most destructive insects known."[26] This ubiquitous pest had travelled eastward from the Rocky Mountains at an average rate of seventy miles a year and had crossed the Mississippi in 1865. By 1874 it had spread through all the southeastern counties.

The few agricultural scientists of that time made no attempt to minimize the calamity. In 1875 Professor Rathvon intensified the general gloom by this pronouncement: "No other insect has ever before become such an object of such profound solicitude by so large a number of the people, especially the laboring classes and the poor; because the plant-food this insect directly effects, is the 'poorman's bread' . . . Amongst a very large portion of the poor and middle classes of both Europe and America, the potato is the leading staple of consumption, and whenever or wherever that is seriously assailed, from any cause it never fails to beget the liveliest apprehensions of famine, suffering and distress."[27]

The only control measure that Professor Rathvon could suggest at first was hand picking, "using a pair of wooden or iron pincers made for that purpose." A few years later he recommended dusting the vines with Paris green mixed with flour or plaster of Paris; or "it may be sprinkled from a watering pot rose, or ejected from a large syringe."[28] Most farmers were afraid to use Paris green; stories were published in the newspapers of persons who had been made sick by eating new potatoes from plants on which Paris green has been sprinkled. Some consumers paid premium prices for potatoes from fields where no Paris green had been applied. Several types of mechanical bug pickers were patented but none was as effective as hand picking or brushing the bugs into pans of kerosene. Gradually, however, the use of arsenicals made headway. By 1880 the potato beetle was no longer feared; it was controlled by dusting the vines with Paris green mixed with lime, gypsum, or ashes. Little spraying was done until after 1900; the implements were too inefficient.

One of the most popular varieties from 1820 to 1870 was the Mercer, or Neshannock, also called the Shannock, Gilkey, and Shenango in various parts of the country. According to *Farmers' Cabinet,* this was originated by John Gilkey, an immigrant from Ireland, who settled in 1797 on land in what is now Washington Township, Lawrence County, about two miles east of Neshannock Creek. In 1800 or 1801 he collected the seed bolls from his potatoes, which were of the varieties red, white, and blue, and sowed them in his garden. From these came this seedling, which he named Neshannock. Mr. Bevan Pearson, then a member of the General Assembly from Mercer County, first cultivated it in the vicinity of Philadelphia from seed obtained from Mercer County and named it after the county where it was first grown.[29]

The Mercer was grown to advantage in all the eastern states. In 1843 the editor of *The Cultivator* described this famous variety: "The Mercer is in shape much like the long pinkeye, but generally larger and longer. It is slightly tinged of a reddish or purple color, and when cut, streaks of the same color are found running through it. When cooked, these mostly disappear. It is one of the most valuable of table potatoes, white, mealy, and of good flavor."[30] Other popular sorts prior to 1870 were the Pink-eye, Peach-blow, White Halifax, Red Halifax, Christie, and Centennial Blue. After 1870 the Peerless, Early Rose, and Late Rose came into favor. There were hot discussions in farm journals as to whether potato varieties, if planted near each other, could "mix in the hill." Not until a generation later were the observed changes in form and color recognized as asexual or bud variations.

There was little progress in potato culture until after 1920; few growers sprayed thoroughly or planted on leguminous sods and none planted disease-free seed. Prices were low; there was little incentive to improvement. Potatoes were grown throughout the State on general farms in small acreage; the most important commercial districts were Allegheny, Bucks, Lehigh, and Erie counties. The average acre yield declined from ninety bushels for the period 1865-1870 to seventy bushels for the period 1882-1892. This was the lowest point; thereafter it gradually increased to 108 bushels for the period 1921-1926.[31]

The close of the nineteenth century found potato culture, with few exceptions, still a neglected phase of general farming.

POTATO CULTURE, 1920-1940

Between 1920 and 1940 potato growing was transformed from a casual phase of general farming into a highly specialized and efficient commercial industry. No other aspect of Pennsylvania agriculture, unless it be poultry husbandry, experienced a more remarkable development in so short a period. Many individuals and organizations contributed to this forward movement. The most potent factor was the Agricultural Extension Service, particularly E. L. Nixon—"the flaming evangelist of potato mentality"—and John B. R. Dickey. The movement centered around four points—better spraying, the use of disease-free seed, more efficient methods of culture, and more effective marketing.

The wholly unsatisfactory status of potato disease control in 1916 is reflected in a statement by the Pennsylvania Agricultural Experiment Station that year: "A conservative estimate of the loss to the potato crop from diseases is 20 per cent. . . . This loss amounts to about 4,500,000 bushels annually."[32] About twenty different diseases were recognized, of which late blight caused the greatest loss. Leaf hopper and black flea were the most serious insect pests.

Prior to 1920 what little spraying was done was mostly with hand pumps which developed a pressure of only 100 pounds or less and applied about sixty gallons of spray to the acre through one nozzle to a row; this provided very inadequate coverage and protection. By 1928 traction and gasoline power pumps which developed 200 to 300 pounds pressure were in common use. Attached to them were "spray booms" which covered four to six rows with Bordeaux at one round, three nozzles to a row. It was estimated that over 30,000 acres of potatoes were sprayed in 1925 and that the resulting average increase in yield was forty-four bushels an acre.[33] In some years the gain was over 100 bushels. By 1936 there were 13,000 power sprayers in operation. In 1915 three or four sprays were considered sufficient; in 1937 some growers applied twenty sprays to combat a severe outbreak of late blight. Dusting instead of spraying was tried about 1925, but was less effective.

As long as potatoes were grown mostly on general farms in small fields it was difficult to justify the purchase of a traction sprayer by an individual farmer. Ten or more farmers sometimes cooperated in purchasing one for use in a "spray ring." The first such cooperative was organized in 1919 in Potter County; it comprised twenty-three farmers. By 1923 there were spray rings in operation in fifty-two counties and serving more than 3,000 farms. After 1929 spray rings gradually disappeared and privately-owned tractor-take off or gasoline power sprayers replaced the traction and horse-drawn machines of earlier days. By 1940 potato growing by general farmers, save for home use, was definitely on the wane and the industry was passing into the hands of potato specialists, each of whom had a large acreage and owned one or more power sprayers. These developed 300 or more pounds pressure and covered eight to twelve rows at a round.

In addition to blight the potato is subject to a number of parasitic and degenerative diseases which reduce yield. Of these, leaf roll, mosaic, blackleg, fusarium wilt, stem rot, giant hill, and rhizoctonia are most common. They cannot be combatted by spraying; control is attained by planting seed that is free from these diseases. Before 1920 Pennsylvania produced no certified disease-free seed; growers had to buy it from Maine, Michigan, and other states. In that year the State Department of Agriculture began to certify seed potatoes grown in those parts of the State that have the coolness of high altitude and a short, moist season, conditions that are most favorable for the production of disease-free seed. Potter and Somerset counties are favorably situated in this respect.

In 1923 more than 67,000 bushels of certified seed were produced by sixty-three growers; in 1939, 183,000 bushels certified by ninety-two growers in sixteen counties. The fields are well sprayed to control late blight; in addition, they are inspected at least twice during the growing season and "rogued" by the elimination of all plants that show symptoms of any of the degenerative diseases. The tubers must be of high grade and characteristic for the variety. In 1933 only 424 acres of the 687 entered for certification were passed. The average yield of certified fields that year was 323 bushels an acre.[34] Notwithstanding the progress made in producing certified seed in this State, much more is purchased outside the State than within. In 1933 it was reported, "3289 of our potato growers representing 50 counties received or purchased disease free seed. . . . More than a million bushels of this seed now in storage throughout the state will be planted by more than 13,000 growers in 1934."[35]

In 1918 the imported potato wart disease was discovered by the Pennsylvania Department of Agriculture in Highlands, a small mining town in Luzerne County, before it had a chance to spread to areas of commercial production. A survey revealed that it was present in four townships of two counties. In 1926 it was found in 813 home gardens and on one farm in fifty-eight towns and villages. The entire area was placed under federal and State quarantine in 1918. Farmers and home gardeners in the quarantined area were required to grow only the

Spaulding Rose variety, which is immune to the disease. Eventually the quarantine and continuous planting of immune varieties starved the disease out of existence.

Of the several cultural practices that were popularized after 1920, none was more conducive to economic production that that of planting potatoes after a leguminous sod. In 1928 eighty-nine per cent of those who were eligible for membership in the 400-bushel club planted after legumes, commonly red clover or alfalfa. In the great Lehigh County potato growing district the prevailing rotation is potatoes, wheat, and alfalfa or red clover. The land is plowed but one time in this three-year period. Some growers prefer a two-year rotation of potatoes and wheat, red clover being seeded with the wheat. When potatoes are grown in the standard Pennsylvania rotation in the southeastern counties, barley is substituted for corn, since potatoes are a cultivated crop.

With greater specialization, the number of varieties grown commercially has been sharply curtailed. Prior to 1935 the Russet Rural comprised more than three-fourths of the commercial crop, then Katahdin largely superseded it. Other varieties were White Rural, Green Mountain, and Irish Cobbler. These five almost completely displaced Blue Victor, McCormick, Peach-blow, Early Rose, Late Rose, Carman, Sir Walter Raleigh, Rural New Yorker, Burbank, Petoskey, and other varieties that were popular prior to 1920. Russet Royal was introduced about 1920 under the name Dibble's Russet. Since 1920 the Pennsylvania Agricultural Experiment Station has been breeding potatoes in the hope of producing blight-resistant varieties; there is promise of ultimate success.

Prior to 1920 the manual labor requirements in producing potatoes were higher than those of any other field crop except tobacco. By 1940 potato growers were the beneficiaries of almost as much labor-saving machinery as corn growers. They had mechanical seed cutters, planters, sprayers, cultivators, diggers, and other specialized equipment. Mechanical pickers are available, but most growers do not use them. The peak labor loads, planting and harvesting, come before and after hay and grain harvest. The back-breaking task of digging potatoes by hand has been banished. In the early days, says *The Guide Post,* some men acquired great skill in digging potatoes by hand. It is recorded that one Horace Johns of Tioga County made a profession of potato digging. He usually dug 2,000 to 2,500 bushels each year and required three or four pickers. One year he dug 104 bushels in four hours with a potato hook.[36] Mechanized farming has supplanted these human dynamos.

MERCHANDIZING PENNSYLVANIA POTATOES

The marked progress in methods of production since 1920 has been accompanied by equally marked improvements in merchandizing.

Pennsylvania produces mostly late or main-crop potatoes; these enter a highly competitive market. The freight on potatoes from Maine in 1940 was thirty-six cents a bushel, from Michigan thirty-five cents, from Minnesota forty-eight cents, and from Idaho sixty cents; nevertheless, 5,000 cars or 3,000,000 bushels were shipped into the State from these and other competing states every year.

In attempting to meet this competition, the problems of relative cost of production, standardization of grade, and quality of product are uppermost. One of the chief difficulties in merchandizing Pennsylvania potatoes in 1920 was the small proportion that could be guaranteed to be of standard grade. Another was the outmoded method of marketing them in 100-pound burlap sacks. In 1925, when the Pennsylvania Department of Agriculture began shipping-point inspection, only seventy-six per cent of the potatoes inspected graded U. S. Standard No. 1.[37]

The organization of a State-wide cooperative to improve both grade and package was stimulated by the disastrous marketing season of 1934. On January 3, 1935, Pennsylvania U. S. No. 1 Russet Rurals and Green Mountains sold in Philadelphia for seventy-five to eighty-five cents a 100-pound sack; partly-graded stock brought only sixty to eighty-five cents, and no prices whatever were quoted on U. S. No. 2's.[38] The operation of the National Potato Control Act of August 15, 1935, did not help matters; the quota of tax-exempt sales allotted to Pennsylvania by the federal agency in 1935 was 14,124,000 bushels as compared with 32,560,000 bushels for Maine. The State Potato Growers' Association vigorously protested the Act in both principle and operation. It stated, "Potatoes are grown on 137,000 farms in Pennsylvania [and] in thousands of gardens. . . . To pro-rate a State allotment under these conditions is going to be difficult at the best. . . . The surplus problem in the Potato Industry today arises largely from those areas where potatoes are grown more or less on a one crop basis."[39] In spite of this protest, crop acreage and marketing allocations were continued, but they were relatively ineffective in this State. In 1938, under the federal Soil Conservation and Domestic Allotment program, the indicated reduction in Lehigh County was 5,000 acres, or thirty-six per cent of the total potato acreage of the county, as compared with an average reduction of ten per cent for the United States as a whole.

In an effort to meet this discouraging situation, the Pennsylvania Cooperative Potato Growers' Association was organized in 1936. It was successor to the Pennsylvania Potato Growers' Association, a strictly educational agency, formed in 1917. This was reorganized as a cooperative in 1922 under the cooperative act of 1919, but was an educational body only until 1936, then the name was changed and cooperative marketing begun, although it continued to function as an educational agency also. A paid Secretary and General Manager was employed, a trade mark registered, and a consumer package that had been recommended by chain store retail distributors was adopted—the fifteen-pound peck paper sack. This package, together with the mesh sack of similar size, has become popular with consumers, displacing the 100-pound burlap sack of earlier years.[40]

There was no centralized grading and packing under the supervision of the Association, as in most marketing cooperatives. Bags bearing the Association brand were sold to members who agreed to grade and pack according to standards set by the Association. The educational and marketing program of the Association was financed mainly by income from the sale of these bags. Maintenance of grade was entrusted to volunteer inspectors who were trained by the Pennsylvania Department of Agriculture in periodic packing schools. In 1938 the Department reported that nearly 700 persons had attended the eight Inspectors' Training Schools held during the season throughout the State, and that almost half of those in attendance had taken the inspector's test. Most of the sales were to chain store organizations. The central office did not, itself, merchandize potatoes; it assisted local cooperative groups or individual members to find buyers. Nearly every county had one or more local cooperative potato marketing associations. Not all members of the Association marketed through it.

In 1938 the organization of the Pennsylvania Department of Agriculture included "Potato Interests: An agency devoted to the promotion and advertising of Pennsylvania Potatoes and Pennsylvania's Potato Industry."[41] This program soon fell by the wayside. The marketing program of the Association was based on a working agreement with the Pennsylvania Chain Store Council. A joint conference committee representing both producers and distributors met at stated intervals to further mutual interests. "In 1938 during a ten month's period the equivalent of 2,243,584 consumer packs were marketed, from 33 counties."[42]

A unique feature of the activities of the Association was the building and operation of "Camp Potato" on a 270-acre tract near Coudersport, Potter County. This was dedicated on August 17, 1938. The buildings were moved by the potato growers from a former Civilian Conservation Corps Camp at Ridgway, Pennsylvania. The camp was intended to provide facilities for the prosecution of the potato breeding project of the Association, camping facilities for organized rural groups, especially farm youth, and recreation for potato growers and their families. The summer meeting of the Association and the crowning of the "Potato Queen" occurred there.

In 1925 only about ten per cent of the Pennsylvania potato crop was shipped by rail to markets, mostly cities within the State; ten years later the motor truck carried practically all. After 1920 the number of potato bank storages increased rapidly. The results of the carefully-controlled and long-continued experiments on potato storage by L. M. Marble of Canton in his private laboratory were utilized to advantage by the industry.[43]

In 1940 approximately 145,000 Pennsylvania farmers grew potatoes commercially. They were of two types: about 135,000 general farmers who grew one-half to three acres each, mainly for home use but with some surplus to sell; and about 10,000 potato specialists who grew from ten to fifty acres each, sometimes more. As in fruit growing, the trend was definitely toward the ultimate concentration of the industry in the hands of large growers, who could justify the purchase of specialized equipment. The total acreage in 1940 was 168,000 and the total production was 21,000,000 bushels. This was only about half the 273,000 acres of 1915, when the crop was 20,502,000 bushels. The reduction in acreage had been offset by an increase in average yield, from 70 bushels an acre in 1917 to 125 bushels in 1940. The highest acreage was in 1917, a war year, when 321,000 acres were grown.

Lehigh County led in potato production in 1940 with 2,557,000 bushels. It also led in average acre yield—191 bushels. Lancaster, Potter, Somerset, Northampton, York, Cambria, and Carbon counties also were important centers of production. The most highly specialized potato growing district was the Berks shale loam area of northwestern Lehigh County; Heidelberg Township averaged fourteen acres of potatoes a farm. The excellent local market outlet in Pennsylvania is evidenced by the fact that in 1940 more than half the crop was sold at the farm. In 1880 the average per capita consumption was three bushels; in 1940 it was less than two bushels. The potato no longer was the "poor man's bread."

The average yield for the State is necessarily much lower than the yield secured by good growers under favorable soil and climatic conditions. Yields of 300 bushels an acre are common and yields of 400 bushels no longer are considered noteworthy. The Keystone 400-Bushel Potato Club was organized by the State Potato Growers' Association in 1922, the first in the United States. The idea, however, was not new. In 1885 a pamphlet by "Joseph" was published by the Franklin News Company of Philadelphia, in which it was predicted that 400 bushel yields would become common. Prior to 1922 a few yields of 400 bushels or more were reported, but the validity of these records was not well attested. By 1932 Pennsylvania had more growers who had a certified 400-bushel yield than all other states combined. By 1938 there had been recorded, since 1919, 1,319 measured yields of more than 400 bushels an acre. Of these, 233 were over 500 bushels, and thirty-two were over 600 bushels.

The "highest yield per acre" has risen steadily, and the limit has by no means been reached. In 1925 it was 571 bushels; in 1926 it was 688 bushels. The record of 696 bushels made by H. J. Walton and Sons of Kennett Square, Chester County, in 1928, stood for ten years.[44] In that year eighty-one growers had yields of over 500 bushels and ten of over 600 bushels.[45] The Walton record was exceeded in 1938 when *Pennsylvania Farmer* reported, "The Hershey Industrial School Farms at Hershey, Pa., dug an acre of potatoes last month [September] which yielded 741 bushels. The acre was measured by Assistant County Agent Miller. . . . All of the potatoes in the acre were dug and weighed." This crop, however, had the benefit of overhead irrigation.[46] More significant than the yields of these pampered acres, perhaps, was the record of Jacob S. Wile of Souderton who, in 1926, raised 10,000 bushels on twenty-five acres.[47]

TOBACCO

The acreage of this exacting crop has increased more, proportionately, since 1840 than that of any other field crop—from 2,743 acres in 1870, yielding 385,000 pounds, to 33,700 acres in 1940, yielding 50,586,000 pounds. In 1840 York, Lancaster, Dauphin, Northumberland, Westmoreland, and Fayette counties all reported yields of 10,000 or more pounds. The peak of the acreage was reached in 1910, when 41,472 acres produced 46,164,000 pounds.

In 1840 tobacco was raised for home use in nearly all parts of the State; after 1900 its culture was limited to a few commercial areas and very little was grown for home use. In 1840 tobacco production in York County was three times greater than that in Lancaster County, but the latter county took the lead in 1860 and has held it ever since. Lancaster County produced only fifteen per cent of the tobacco crop of the State in 1840; in 1940, ninety per cent.

Tobacco is the main cash crop in Lancaster County. It follows corn in the rotation on about three-quarters of the farms, and is followed by wheat. Tobacco requires soils of high fertility, preferably limestone, heavy manuring, and large applications of commercial fertilizers rich in potash. It also requires much more manual labor than any other staple crop of the State, and highly specialized skill in production, curing, and marketing; this can be acquired only by years of experience. Because of its exacting labor requirements, few farmers grow more than ten acres and commonly only four or five.

Tobacco culture is almost universal among the German sectarians of Lancaster County, partly because the work of stripping the leaves keeps the farmer and his boys busy during the winter months and partly because of its high potential money value to the acre—from $300 to $800. It fits in well with the other farm enterprises of that county—wheat, corn, alfalfa, steer feeding, dairying, and poultry.

Even the ultra-conservative Amish, Dunkers, and Mennonites, who are forbidden by their churches to use tobacco personally and carry on a crusade against it as religious groups, commonly grow tobacco because it brings better returns on their high-priced land than any other crop. In recent years, however, some have given up tobacco culture on religious grounds and have turned to production of fluid milk and canning tomatoes as their main sources of cash income.

Most Pennsylvania tobacco is used in the manufacture of cigars, as it has been since 1828. In that year several farmers near Ephrata rolled the leaves into cigars or "stogies" (Conestogas) which they sold at country stores at the modest price of five for one cent. Near New Holland, "about 1843, a cigar-maker named Bachmann grew annually an acre or two of tobacco which he made up into cigars for sale at three fips or 18¾ cents a hundred. . . . The first tobacco grown on a commercial scale in Clinton County was grown by Thomas Pelton, a 'Connecticut Yankee,' in 1845 . . . in the village of Liberty, now called Island. The variety grown was Connecticut Broadleaf. . . . The first crop of Havana Seed tobacco was grown on Great Island [Clinton County] in 1881. . . . John Rhinearson, a native of Lancaster County, grew the first crop of tobacco in Lycoming County . . . in 1849. . . . [The culture of tobacco in] Bradford and Tioga Counties is . . . a southerly development of the Big Flats of southern New York. . . . Sanford Elment of Big Flats, who in 1851 grew a crop of six acres, is supposed to be the first . . . commercial grower in southern New York."[48]

Tobacco culture in Pennsylvania was given impetus by the Civil War. In 1863 it was stated, "The extraordinary high price of tobacco, consequent upon the rebellion . . . has drawn the attention of farmers to [this crop. It] has become a very important branch of farming in the counties of Lancaster, Chester, Berks, Lebanon, York and Cumberland."[49]

Most cigars were hand-made until after 1890. In 1860 a machine was introduced, but factory manufacture did not begin to displace hand wrapping for several decades thereafter. The first automatic cigar-making machine that was really successful was put into operation in 1919.[50] By 1933 over eighty per cent of cigars were machine-made.

The type of tobacco produced in Lancaster County is Pennsylvania Broadleaf. This is used almost exclusively as cigar filler. It commonly yields 1,200 to 1,800 pounds of cured leaf an acre. The meteoric rise of cigarette manufacture, from 4,632,000 in 1897 to 92,323,000 in 1926, adversely affected the market for Pennsylvania Broadleaf after 1920, since none of it is used in the manufacture of cigarettes. Experiments begun in 1893 by the Pennsylvania Agricultural Experiment Station and the United States Department of Agriculture in cooperation with the Lancaster County Tobacco Growers' Association resulted in a considerable increase in the average yield and quality of Pennsylvania Broadleaf through more efficient fertilizing and plant breeding.

Marketing procedure leaves little opportunity for cooperation among growers. Individual crops are bought at the farms by a representative of the packers, sometimes during the growing season but usually after the tobacco has been cured and stripped. The grower then delivers the leaf to the warehouse of the packer, where it is processed. One reason why there has been little cooperative marketing is the difficulty of securing leaf of uniform grade in quantity; the quality of tobacco grown in the same neighborhood may be quite variable according to soil nutrition and other conditions.

Minor Cash Crops

Flax and hemp were widely grown prior to 1840, especially flax for home use, and were the object of governmental solicitude and subsidy. Thereafter cheap cotton made the culture of flax for the home manufacture of linens unprofitable, although the small family flax patch persisted in the more remote parts of the State until after 1870. In 1855 the Philadelphia Society for Promoting Agriculture considered means of stimulating the culture of flax as a rival to cotton, but nothing came of it. In 1870 the total production was 815,000 pounds, together with 15,000 bushels of seed sold to oil mills. After 1870 flax culture gradually disappeared. It persists today only among a few old German farmers who grow it mainly for old times' sake.

Hemp disappeared from the Pennsylvania farm scene soon after 1840, save for sporadic local outbursts of interest, as in 1909, when it was reported "The cultivation of hemp at Hanover, Pa., has been continued on an increased commercial scale."[51]

In the early years of the Civil War an attempt was made to grow cotton in Pennsylvania, the supply from the South having been cut off.[52] A little was produced, but not at a profit. Several other visionary schemes were inflicted on the public about that time. According to Thomas Meehan, in 1863, "It was recently asserted in the daily papers that the Chinese Tea plant had been found to thrive admirably in some of the interior lands of Pennsylvania. After the numerous dupes who have been caught by 'Australian' Coffee, Tree Cotton and many other ignorant schemes . . . we did not suppose there were any 'green ones' left. But it appears the maxim of the philosopher that there is a 'new fool born every day,' is about right, and we believe it is a fact that there are parties as a company in treaty for a large tract of land to go into Pennsylvania Tea Culture!!"[53]

THE LUMBER CROP

Penn's Woodland is well named. About forty-five per cent of the State, or 13,000,000 acres, is forest land. Of this great area, 1,126,000 acres are State forests, 4,043,000 acres are farm woodlots, and 8,000,000 acres are privately owned commercial forests.

Since early colonial days, farming and forestry have been closely associated. The first cash crop of many farmers was logs; he had to clear his land before he could till it. In later years many farmers continued to "go into the woods" during the winter months. Many others made charcoal until coal superseded it in industry, about 1890. Forest products still are an important source of cash income to Pennsylvania farmers, except in some of the most highly developed parts of the southeastern counties. Chief of these products are saw timber, cord wood, mine props, pulp wood, and maple syrup.

Between 1810 and 1910, central, northern, and western Pennsylvania was ruthlessly stripped of its virgin forests. Before railroads were built, most of the lumbering was done by farmers. They went into the woods after crops were harvested and spent the winter hauling logs to the streams and assembling them into rafts. These were floated down to mills during spring freshets. Twenty-five hundred or more great rafts went down the Susquehanna in a single season, many of them manned by farmers.

After 1840 the era of commercial lumbering by capitalists or companies with large resources, as distinct from private lumbering by settlers, began. Clean cutting was practiced; everything merchantable was removed, without consideration of the renewal of the forests by natural regeneration. Successive forest fires followed the woodsmen. By 1900 the "Pennsylvania desert" comprised more than 5,000,000 acres of cut-over and burned-over land, barren and desolate. Such land frequently was sold by the sheriff for a very nominal sum, just enough to satisfy unpaid taxes. In this way very large tracts were secured by capitalists as an investment.

From 1860 until 1870, Pennsylvania was the first lumber-producing state in the Union and first in the production of tanbark. Hundreds of thousands of stately hemlock trees were cut for their bark alone; the logs were peeled and left to rot or to be burned in the next forest fire. By 1870 the once magnificent stand of white pine, the most valuable species, was so decimated that it was necessary to import pine lumber from Michigan, which then wrested from Pennsylvania the distinction of being first in lumber production. Michigan, in turn, lost its leadership to Wisconsin about 1900, and Wisconsin to the Pacific coast states about 1920. The stands of hemlock and hardwoods in Pennsylvania were practically exhausted by 1890. After 1900 Pennsylvania became a lumber-importing instead of a lumber-exporting State.

In the early years of lumbering, settlers living near streams of considerable size, as Youngwomans, Pine, and Sinnamahoning creeks, floated rafts or logs or squared timber down to the river where they were sold to representatives of eastern mills. The buyers then hired crews to take the rafts down the river. Small rafts were made up on small streams; when these reached large streams they were combined into large rafts for the run down the river. Logs thirty to eighty feet long were tied together with lash poles. Heavy sweeps, often forty to fifty feet long, were used to steer the raft, which might have a rough shanty built on it. When the water was high it was a perilous journey; some rafts were wrecked on rocks and the men were lucky if they escaped with their lives.

About 1850 a new method of getting to mill timber that was near watercourses came into use. Instead of assembling the logs into rafts, they were floated downstream individually to some place on the river which had a boom to receive them. The building of the first boom at Williamsport, in 1846, ushered in the era of lumbering as big business. A boom consisted of long logs fastened together with chains and anchored to stone piers in the river. It caught loose logs coming down from tributaries of the stream and stored them until they were needed by sawmills.

Williamsport became the center of the lumber industry of the nation; at one time more than thirty large mills located there shipped over 300,000,000 feet of lumber a year. Other boom companies were organized along the Susquehanna at Lock Haven, Jersey Shore, Muncy, and elsewhere. Ultimately all these were absorbed by the Susquehanna Boom Company, organized in 1849. "One of the greatest [disasters] in the history of the lumber trade," says James Elliott Defebaugh, ". . . occurred June 1, 1889, on which date the West Branch [of the Susquehanna] reached the unprecedented height of thirty-three feet one inch. This was over three feet higher than the boom piers, and the result was the loss of over 300,000,000 feet of logs. In addition, many millions of feet of sawed lumber were swept away, mills were wrecked and many manufacturers were ruined. . . . Logs were carried to the Chesapeake bay and out into the ocean."[54]

After 1850 lumbering was done mostly by gangs of lumberjacks employed by lumber "barons," not by farmers. They led a laborious but often exciting and venturesome life. Before snow came they went into the woods and built rude log or board huts for winter use. Their beds were hemlock boughs. The season was from December to March, or as long as there was enough snow for sledding. Their diet was mainly pork, potatoes, and whiskey. The logs were hauled to the banks of streams on bob-sleds drawn by oxen; sometimes a tram road or narrow-gauge railroad was used. Card playing and story telling around the cabin fire, occasional encounters with wildcats, and competition with each other and with other gangs enlivened the arduous labor.

When the snow left the woods in early spring, the gang dispersed. A month or more later, during the spring freshets, the logs were "driven" down the stream. Log driving required great skill and strength and there were exciting moments, especially when an attempt was made to loosen key logs in a jam with cant-hooks or a stick of dynamite. Only with the utmost agility and good luck were these venturesome lumberjacks able to get back to shore over the twisting, tossing mass of logs. On small streams it might be necessary to build flood dams to impound water, which was released when a drive was on.

Log drives and booms were inimical to rafting. Between 1840 and 1875, there was bad blood between log drivers and raftsmen, often flaring into open warfare. Raftsmen sometimes drove great iron spikes into floating logs through the bark so that they would not be noticed; these broke saws and injured mill hands. Log drivers retaliated with stones and fists. After 1880 lumberjacks began to desert Pennsylvania for brighter prospects in the camps of Michigan, Minnesota, and Wisconsin.

Here and there a few voices were raised against the wanton destruction of forests by lumbermen and fire. Most persuasive of these early conservationists were J. T. Rothrock, W. A. Buckhout, Thomas Meehan, and Eastburn Reeder. They were as voices crying in the wilderness, with little or no public response. Even as late as 1886, when the fire-blackened ruins of once magnificent forests were to be seen throughout central and northern Pennsylvania, it was boasted, "There are still great forests of pine timber in the mountains that will yield hundreds of millions of feet, and the primitive hemlock wilderness of Sullivan county, less than 75 miles from Williamsport, has scarcely been broken."[55] Most of the large hemlock stands were owned or controlled by tanneries. Hemlock usually was cut during the summer, when the bark could be peeled off easily; pine, for lumber, in the winter. In his description of his woodland, in 1683, William Penn did not mention white pine or hemlock, the most abundant and most valuable trees in his domain, for he took no trips into the interior.

Pennsylvania was at the zenith of its lumber production between 1850 and 1870, after which the output declined rapidly. In 1935 the State Department of Forests and Waters estimated that Pennsylvania imported about seventy per cent of its requirements of lumber, including all but sixteen per cent of the heavy timber used, all but twenty per cent of the mine props, and all but forty per cent of the pulp wood required.

In 1934 Victor L. Beebe paid this tribute to the forests of his youth: "[The last tract] of original hemlock in Potter County . . . was cut in 1912. . . . The great lumber industry of Potter County covered a period of 105 years, from 1815 to 1920. . . . The great industry that has contributed so much to our wealth and prosperity belongs to the past. Not a single tree is now standing of the noble pines that once covered more than half of our county. Of the great hemlock forests, one very small grove remains. . . . The greater part of our timber of the present day has sprung up in the wake of the lumbermen of forty or fifty years ago. Our woods are clogged by dense undergrowth, and trodden by hundreds of hunters and fishermen from communities far outside our own. They bear but the faintest likeness to the forests that we of the last century knew."[56]

FARM WOODLOTS

More than one-fourth of the forest area of the State, or about 4,000,000 acres, is in farm woodlots of from one to several hundred acres each. Almost every farm, except in some intensive farming areas of southeastern Pennsylvania, notably in the Cumberland Valley, has a woodlot. A majority of them are on land that is better than the average of the forest area, and hence are more productive. Woodlots are an important source of income to the farmer. Until recent years they were his chief supply of fuel, building material, and fencing; they sheltered game; and, in some cases, produced maple syrup and nuts. Under proper management, farm woodlots are a continuing source of income from the sale of sawlogs, mine props, pulpwood, and cordwood. In 1935 about $7,750,000 worth of timber and wood was cut from them. When farm work is slack, especially during the winter, the farm woodlot provides an opportunity for productive employment.

The superiority of farm woodlots over other forest areas is evidenced by the following appraisal: "As a class, . . . the farm forests are the best wooded. They carry an average of 12 cords to the acre . . . they have sixty per cent of the standing timber in the state."[57] One reason for this superiority is that they are better protected from fire, since the owners live close at hand.

The average growth in farm woodlots is about fifty cubic feet of wood a year to the acre, having a value of around $2.50 if sold for use as mine props. About thirty years are required for trees to reach sufficient size so that the amount of the annual growth can be removed without causing deterioration of the stand. Many farm woodlots are producing less than half the volume of wood of which they are capable —half a cord an acre annually instead of a cord or more. Some have been nearly ruined, especially as to regeneration, by grazing. The productiveness of others has been reduced by lack of thinning and selective cutting.

Farmers lost one of their main sources of fencing and timber for farm use when the imported chestnut blight disease ravaged the State, between 1908 and 1925. The State created a Chestnut Blight Commission to combat the disease and it established five laboratories in different parts of the State. For a short time optimism prevailed; in 1912 the Commission announced that the blight had been "halted at the eastern foothills of the Allegheny Mountains." By 1921, however, the Commission admitted that no prevention or control measures had been successful and that all the chestnut trees in the State were doomed. By 1925 practically all were dead. Hundreds of thousands of them stood in the forests for many years thereafter; their naked branches were mute evidence of the virulence of a disease that has baffled scientists of this and other countries.

Since about 1916 farmers living near coal mines have found a profitable market for the product of farm woodlots as mine props, ties, timbers, and lagging. Over 75,000,000 cubic feet of these products are marketed every year. In the bituminous coal regions mine props usually are cut to specific sizes and are sold to collieries by the piece. In anthracite regions a large percentage of the props are either cut the full length of the tree or to a specific size, and are sold by weight or linear measure.[58] Props are of varying lengths; commonly they are twelve to twenty feet long and six to eight inches thick. Some farmers have netted an average of $5.00 an acre a year from the sale of mine props. In many cases, however, it would be preferable to allow the best trees to grow to saw-timber size and to utilize only the thinnings for props.

About 1925 some Pennsylvania farmers began to be interested in the production of Christmas trees. Previously most of the 1,500,000 or more trees marketed in this State every year had come from New England, the Lake states, and Canada. Norway spruce, red pine, Austrian pine, and Scotch pine are grown most commonly, and a smaller number of Douglas and balsam fir. The trees can be grown successfully on land that is not suitable for the staple crops, if well drained. From five to ten years are required to produce a marketable tree. Over 250,000 Christmas trees were sold from Pennsylvania farms in 1940.

Forest tree planting or reforestation has been advocated for many years but only recently has it made much headway. Between 1905 and 1915 a "catalpa craze" swept the State. Many thousands of acres were planted on farms and on the right-of-way of railroads. One nurseryman asserted, not wholly without self-interest, "Of all the trees that are used to grow timber the hardy *Catalpa speciosa* is one of the most valuable. It makes the best of posts and railroad ties and beautiful finishing timber. It combines the lightness of pine with the strength of oak and the toughness of hickory. It is one of the most rapid-growing trees. Planted 1,000 to the acre it will make good fence posts in six to ten years; in twenty years it will yield 100 to 150 telephone or telegraph poles per acre and in thirty years excellent saw timber." Nurserymen reaped a harvest, but they were the only ones who did. A few remnants of these catalpa plantings still may be seen on the right-of-way of the Pennsylvania Railroad.

In recent years the State Department of Forests and Waters has given a decided impetus to forest tree planting on farms by making available free, except for the cost of packing and shipping, seedlings of the standard species that are grown in the nurseries of the Department. In 1927 it was announced, "The total number of trees distributed for reforestation in Pennsylvania by the Department of Forests and Waters, has just passed the 100,000,000 mark. More than 36,000,000 of these were planted on the State Forests, and over 60,000,000 on private lands. Two-thirds or more of the private plantings have been made by farmers, in many cases on abandoned farm land."[59] Farmers are interested in forest tree planting as a long-term investment. It is estimated that red pine, the species planted most commonly, will produce about 25,000 board feet of lumber an acre within fifty years.

Thus far the American people have steadfastly declined to be drawn into governmental regulation of private forests and woodlots, although this policy has been vigorously advanced by some as the most feasible means of conserving this great natural resource. Says the United States Forest Service, "Public regulation [of private forests] probably offers the greatest hope of stopping . . . destruction. . . . Regulation is not a new exercise of sovereignty. Nearly every country that has a real forestry program exercises some degree of control over the handling of private forests. . . . Investigations by the Forest Service indicate that about one-third of the forest land in private ownership could advantageously be taken into public ownership—by communities, the State, or the Federal Government—in order to give the greatest assurance that the resource will be restored and handled in the public interest."[60]

Until about 1875, when cane sugar began to undersell maple sugar, the "sugar bush" was an important source of income in those areas where the sugar maple thrives. "The sugar crop of this country" said the *Potter County Journal* in 1851, "is a very important one. In 1850 there were 1,137 families in Potter County and they made 134,000 pounds of maple sugar or an average of 118 pounds per family."[61] In colonial days and until about 1870, most of the maple sugar was made for use on the farm, with a small surplus for barter at the country store; now most of it is sold. Prior to 1900 more maple sap was marketed as sugar than as syrup; by 1940 the reverse was true.

The number of trees tapped and the volume of maple products (one gallon of syrup being equivalent to eights pounds of sugar) have steadily declined since 1880, when 3,991,000 pounds were produced. In 1940 the number of trees tapped—433,000—was less than half the number tapped in 1920. They produced 36,000 pounds of sugar and 112,000 gallons of syrup, equivalent to the total of 932,000 pounds of sugar.[62] Somerset County, which led in sugar production in 1840, still was in the forefront in 1940, producing about one-third of the crop. Other important counties were Erie, Crawford, Tioga, Bradford, and Potter. The scarcity and high cost of labor and the pasturing of sugar bushes are responsible for much of the decline in maple products. High prices paid for maple logs have resulted in the destruction of many old sugar maple groves.

Methods of production have changed materially. The old-time heavy iron kettles have been supplanted by light galvanized iron evaporating pans and other more effective and labor-saving equipment; with these, five times as much syrup can be made in a day as fifty years ago. Such is the commercial value of a reputation for producing a superior product, that until quite recently a considerable proportion of Pennsylvania maple products was shipped to Vermont where it was sold as "Pure Vermont Maple Syrup."

Potato picking

VIII

Dasher churn

DAIRYING, 1840-1900

THE DAIRY industry which now dominates the agricultural economy of Pennsylvania was born about 1830. Between 1840 and 1900 it was transformed from a simple home enterprise, conducted mostly by farm women, into a highly organized commercial industry conducted almost wholly by men. The products of the dairy cow offered for sale in 1840 were mainly farm-made butter and cheese; fluid milk was a comparatively minor article of commerce. Factory manufacture of butter and cheese began to supersede farm manufacture about 1875. By 1900 this, in turn, was giving way to the sale of market milk.

The most outstanding scientific developments which contributed to the remarkable evolution of the dairy industry during this brief period were the invention of the vacuum condenser by Gail Borden in 1856; the discovery that harmful bacteria may be destroyed by heating milk to a temperature of about 140 degrees, by Louis Pasteur in 1860-1864; the introduction of the silo about 1875; the invention of the first continuous milk separator by De Laval of France in 1879; and the development of a cheap and efficient method of determining the butterfat content of milk by S. B. Babcock of Wisconsin in 1892.

DAIRY BREEDS

In 1840 and for many years thereafter most dairy cows were either scrubs or grades, scrubs being animals of unknown breeding and grades animals that had at least "a dash of purebred blood," usually from a purebred sire. Only a very few, certainly less than one per cent, were purebred. Most of them were "dual purpose" stock, being valued fully as much for beef as for milk.

In 1846 the editor of *Farmer's Cabinet* reported, "It is known that of the numerous butter dairies within the verge of the Philadelphia market, scarcely one is composed of Durhams, or indeed of any of the imported breeds; and that as a general rule, they are wholly composed of the native breed of cows, with no admixture of foreign blood. . . . Nor do I know of a single instance, where [full-blooded Durham cattle] have been superior for butter properties, to the common stock."[1] In 1852 the editor of *The Cultivator* stated, "Most of the cattle which we saw, appeared to be of mixed blood, and mixed too, without regard to any particular rules or object. In some neighborhoods the blood of the Short-horn was very obvious. On some farms the full bloods of that breed had been tried . . . ; the general testimony was that they were not sufficiently hardy, and had not, on the whole, manifested any superiority for the dairy."[2] Some good farmers bred the native stock, in which Devon ancestry predominated, for high butter production; a few animals averaged 200 pounds of butter a year.

Although most farmers were reluctant to keep purebred stock, a small number of well-to-do gentleman farmers near Philadelphia vied with one another in attempting to secure high yields from imported cows. The breed situation about 1840 was described by Nicholas Biddle: "We have . . . stock of every description. There are the Alderneys, with their rich milk, itself a cream. The Ayrshires, copious givers of milk strongly inclined to better. . . . The Devons, . . . fitted, by their milkiness, for the dairy, by their delicate flesh for the knife, by their quickness for the plough, they claim to be second to no other race . . . except the Short-horned Durham, . . . which undoubtedly now unites . . . the qualities of abundant milk, of easy fattening, of early maturity, and of excellent food, more than any other race of horned cattle."[3] At the second annual fair of the State Agricultural Society held at Lancaster in October, 1852, many Durham and Devon cattle were exhibited and a few Alderney, Holstein, and Ayrshire, but "a very few only" of native or grade stock.[4]

The Shorthorn, or Durham-Shorthorn, was the first breed to become popular for dairying; the Devon, which had preceded it to these shores, was highly valued as a good general purpose breed but was more efficient as power on the farm than as a producer of milk or beef. The first Durham in this country, said Henry Clement in 1855, "was a cow, called the Kilton cow, which had been sent from England about 1805, on speculation. She was valued at two hundred guineas, but at that price found no purchaser, and was sent back. She was with young when she arrived, and while here she had a bull calf, which was given to Jacob Serrill, of Darby, Delaware County, Pa., for the trouble he had had in keeping the cow. From this calf, by crossing with our so-called native cows, very fine cattle had been obtained—steers weighing from fourteen to sixteen hundred pounds."[5] Evidently this particular strain of Shorthorn was valued more for beef than for milk.

The "Milking Shorthorn," a branch of that breed, originated in England about 1800. It was distinct from the original breed, although of the same blood lines, and was bred for high milk production as well as for beef. Early importations of this type usually were called Durham or Improved Durham-Shorthorns because so many of them came from Durham County, England. Between 1825 and 1875 the milking type of Shorthorn led in importations. It gave rise to a controversy, which raged for many years, on the relative merits for milk production of the "dual purpose" cow and the more highly specialized dairy breeds, as the Jersey and Guernsey.

According to *Farmers' Cabinet* in 1840, "For the introduction of the Durhams into this country, we are indebted primarily to Dr. James Mease, the Vice President of the Philadelphia Agricultural Society, who first called the attention of J. H. Powell, Esq., then in England, to their merits; while to *him* is due . . . their first importation."[6] In 1830 *American Farmer* related that of the early importers and breeders of pure bred livestock none achieved quite the distinction of John Hare Powel of Philadelphia. He began to import Shorthorns in 1822 and his stock was dispersed throughout eastern Pennsylvania. By 1830 Henry A. Carpenter of Lancaster County had a herd of 100 Shorthorns, mostly from Powel stock.[7]

The Durham-Shorthorn, mostly grades, was the most popular breed in Pennsylvania dairies until after 1880. At the 1870 exhibition of the State Agricultural Society more animals of this breed were shown than of any other. Purebred bulls were used to upgrade native stock. In 1853 an Allegheny County farmer stated, "It is, I believe, the general impression that a strong cross of the Durham upon the better breeds of our native stock, is better than the pure blood because this cross, while it preserves the early maturity and good fattening qualities of the Shorthorns, imparts the greater vigor of constitution of the native, and adapts it to the rigors of our winters."[8]

While the dual-purpose-cow controversy raged, with considerable venom on both sides, a steadily increasing number of farmers were becoming partisans for one or another of the specialized dairy breeds. The battle of the breeds, which still continues, had begun. The first of the strictly dairy breeds to achieve popularity was the Alderney. Animals were imported under this name from the Channel Islands of England—Jersey and Guernsey—before 1820 by Maurice Wurtz of Philadelphia, but they did not attract much attention until after 1840. According to George F. Lemmer, "Apparently the first of the imported Alderneys in the United States were raised by Nicholas Biddle of Philadelphia and Dr. Philip S. Physick of Germantown."[9]

George Blight of Philadelphia states, "In 1842, the Jersey and Guernsey cattle were first exhibited and classified for the award of premiums [by the Philadelphia Society for Promoting Agriculture] under the name of Alderney. . . . There was no distinction made between the cattle of the two islands, and many crosses were made with the full approval of the greatest admirers of both breeds. This continued for some years, when the mistake was discovered. The establishment of the herd-book remedied this defect, but most of the breeders had great difficulty in registering their cattle, having mixed the blood of the two islands."[10] In the premium list for the exhibition of the Society in 1859 occurs the first division of Alderney into Jersey and Guernsey.

"About 1840," said Samuel Betts in 1885, "Nicholas Biddle, President of the United States Bank of Philadelphia, purchased the first cow known to be a pure Guernsey that was landed on our shores. She was purchased from the consignees of the schooner Pilot, Captain Belin, from Guernsey, and cost $500. In 1861 a committee of the Philadelphia Society for Promoting Agriculture reported that Alderney cattle were superior to Devon and Durham, the then prevailing breeds, 'because dairy farmers near Philadelphia require cows which are either good milkers or good butter cows, since the city of Philadelphia affords a ready cash market for both butter and milk.' "[11]

By 1870 the superiority of the Channel breeds for milk and butter production was generally recognized near Philadelphia except by a few partisans of other breeds. "The celebrated dairymen of Chester and Delaware counties," said the *Lancaster Farmer* in 1869, "have discovered the superior qualities of the Jersey or Alderney stock, and prefer them to all others for dairy purposes. . . . One of [the Jerseys] 'Duchess,' . . . is now giving, by actual measurement, 21 quarts of milk daily, which yields more than four quarts of the richest cream."[12]

Then, as now, breed rivalries were keen. One of the most vitriolic critics of the Channel breeds was James Gowen of Philadelphia, a breeder of Improved Durham-Shorthorns. In 1854 this not wholly unbiased gentleman pontificated, "I consider the Alderneys to be the most unprofitable to the farmer; because they are under-sized, ill-formed, and such hard feeders, that it is impossible to get beef on them. . . . The cry is they give rich milk and make yellow butter—so does almost every hide-bound, ricketty cow, that may be picked up along the lanes or roadside . . . *because she gives so little.*"[13] Obviously he was committed to the dual-purpose ideal. In 1841 the editor of *Farmers' Cabinet* made a much more discriminating appraisal of the Guernsey: "These peculiarly thin and disreputable-looking breed of cattle . . . there was but little as a covering to her bones, . . . it was in vain to endeavor to put it there, for it would not stay, running all into butter . . . the more food is given, the more milk will be received. Now, without regard to the appearance of the animal, are not such cows just what we want for the dairy?"[14]

After 1880, when the swing toward dairying had made considerable headway, the specialized milk breeds—Jersey, Guernsey, Holstein, Ayrshire, and Brown Swiss—had largely displaced the general purpose Shorthorn and Devon that had been popular in the days when a dairy cow was expected to produce beef as well as milk. The Devon disappeared when no longer needed as oxen. A survey of the dairy herds of the State by counties, made in 1883, revealed that "Jersey or Channel Island" and Guernsey were preferred in twenty-eight counties, native stock in eighteen, Durham-Shorthorn in twelve, Holstein in five, and Ayrshire in one.[15] By 1900, when market milk had become the main outlet for Pennsylvania dairies, Holstein led.

The organization of breed associations gave impetus to the development of superior blood lines within each breed. Breed improvement was stimulated by the compilation of herd books, the first of which was the *Shorthorn Herd Book,* published in 1846 by L. K. Allen. Soon this was followed by the herdbooks of other breeds. In these books the animals of pure blood are given a number and their pedigrees set forth.[16] Very few farmers, however, had purebred herds. Only two per cent of the 900,000 cows milked in 1890 were purebred; the remainder were grades and natives.

HERD IMPROVEMENT

In 1840 the dairy cows of Pennsylvania averaged about 2,500 pounds of milk a year; in 1889 the average was 3,525 pounds and in 1919 it was 4,051 pounds.[17] Prior to 1900 production was more likely to be expressed in terms of butter than of milk. In 1848 the average yield of 8,500 head of "butter dairy cows" in Delaware County, which then vied with Chester for supremacy in dairying, was 125 pounds a head.[18] In those parts of the State where dairying was not as highly developed at that time the yield was much lower; in 1851 the average yearly butter production of the cows of Susquehanna County was eighty pounds and the average retail price was twelve and one-half cents a pound.[19] There was little inducement to expand dairying with these yields and prices.

The reason for the very low average production by a cow was not only lack of selective breeding, except by a few farmers, but also the prevailing practice of "summer dairying." Usually cows were bred to freshen in early spring. They produced well when pastures were lush, then began to fall off; by late autumn they were reduced to strippings and throughout the winter they were dry. Only the few farmers who provided winter succulence in the form of root crops obtained a flow of milk throughout the year. In 1880 Eastburn Reeder, a prominent dairyman of Bucks County, stated, "The census of 1870 shows that [the cows of Bucks County] average [only] 100 lbs. of butter per cow. While it is five or ten per cent better than the average of the State, it is still far below what it should be. Many dairymen have brought the average of their herds up to 200 lbs. per cow, and some as high as 300 lbs."[20] Not until the silo was in general use, after 1900, was there any considerable increase in the average production per cow. By 1900 any cow that did not average 4,500 pounds of milk a year was considered unprofitable; some herds averaged 400 pounds of butter.

Summer dairying continued in some parts of the State until after 1900. Speaking in 1904 of conditions in the northern tier of counties, L. W. Lighty said, "Along the valleys are scattered many cheese and butter factories and some condenseries, but the strangest peculiarity about the entire dairy industry of the greater part of this section is the fact that like the groundhog it goes into a state of hibernation about December 1st and does not even come out to see its shadow. . . . I am told they [the cows] nearly all go dry about this time. . . . I find that the cow that must have a three or four months' vacation annually will do little more than pay for her feed bill and often falls short of that."[21]

While average production by cow was low during this period, a few very creditable individual yields were recorded. In 1840 "Dairy Maid," an imported Durham-Shorthorn owned by James Gowen of near Philadelphia, gave 235¼ quarts of milk in seven days, four months after calving, an average of 33½ quarts a day.[22] Another cow of the same name owned by Jonathan F. Garrard, "from July 23, 1853, to August 11, inclusive, . . . gave three hundred and seventy-five pounds of milk, which produced thirteen pounds of butter, of the best quality."[23] The sire of this cow was a purebred Durham and her dam a purebred Devon. Still another cow named "Milk Maid," a grade, was awarded a premium by the State Agricultural Society in 1854, "having . . . produced two hundred and twenty-eight quarts of milk in ten days, viz.: from the 12th to the 22d of Sept., 1854, inclusive; that the weight thereof was five hundred and forty-seven lbs., and that it took eighteen quarts of said milk to make one pound of butter."[24] According to the Philadelphia *Inquirer* in 1876, " 'Old Gemar,' said to be the champion milch cow of the world, is to be sent to the Centennial [Exposition] from Williamsport. It is said that she yielded in three days the enormous quantity of 302 pounds of milk."[25]

More significant than these short-period records were those for an entire year. Rosalind, a Guernsey cow five years old, was reported to have produced 7,370 pounds of milk between April 11, 1880, and April 11, 1881.[26] Not to be outdone by partisans of the Channel breeds, in 1884 Holstein breeders proudly proclaimed, "Violet, the noted imported Holstein cow, owned by Edgar Haidekoper, of Meadville, gave 18,677½ lbs of milk in the year from March 24, 1883, to March 23, 1884, inclusive. The greatest day's record was 86 lbs 12 ozs . . . High breeding and high feeding will produce big records."[27]

Sometimes very high prices were paid for exceptionally high producers. According to the Philadelphia *Press*, in 1860, a Montgomery County farmer valued one of his cows for census returns at $1,500: "This will be the highest priced cow that will be contained in the census for this country, if not of the State. . . . We've heard [the owner] say that she will give twelve hundred gallons of milk a year."[28] In 1885 A. M. Fuller of Meadville, Crawford County, "was offered thirty thousand dollars for the 'Little Mary Ann of St. Lambert,' [a Jersey cow,] . . . he did not accept the offer."[29]

There was little herd improvement by individual dairymen through the elimination of low-yielding cows until after 1875. The methods of determining relative merit were laborious and inaccurate. In 1852 the Committee on Dairying of the State Agricultural Society advised, "In nearly all our dairies are to be found cows which, while yielding considerable quantities of milk, make very little butter. Every farmer ought to test the quality of every cow's milk when [she is] four years old. The test is very simple. Strain the milk for a few successive days into tumblers about six inches deep. Compare the thickness of the cream with that of cows of established milking properties. Weigh the milk for a few days and churn it, or the cream from it, by itself, and make a similar comparison. Many cows will be turned out of dairies by these simple tests as worthless."[30] In 1882 a speaker at a meeting of the State Dairymen's Association stated, "One reason why the country contains so many poor cows is the boom in dairying, which has lasted now for twenty years. It has led to the raising and keeping of anything and everything that will give milk, though it be no more than the yield of a goat."[31]

As long as dairying was a household enterprise, there was little incentive to check the performance of individual cows. The introduction of the associated system of dairying—cheese factories and creameries—

about 1875 gave impetus to herd improvement, since the product of one herd was brought into direct comparison with that of other herds in the neighborhood. Not until the Babcock test was available, after 1892, was there close scrutiny of individual performance. In 1885 the "lactobutyrometer" was said to be a "ready and fairly accurate instrument for determining the quantity of butter fat," but it was seldom used by farmers. In 1890 the Pennsylvania Agricultural Experiment Station stated, "With the rise of the creamery system and its close competition . . . creamery men no longer regard it good policy to pay the same price for 100 lbs. of milk yielding 2 lbs. of butter fat, as for 100 lbs. yielding 6 lbs. of butter fat."[32]

The first reference to the use of the Babcock test in Pennsylvania was in 1891.[33] This test was so simple, reliable, and inexpensive that it quickly superseded all others. It was first used on The Pennsylvania State College herd in 1892.[34] After that, creamerymen and farmers began to use it, but with many misgivings. Patrons of creameries and cheese factories were opposed to it for a time on the ground that it could be used by dishonest creamerymen to defraud them. After 1900 the use of the Babcock test and the milk scales for detecting "boarder cows" became general and Herd Improvement Associations were formed.

From time immemorial some farmers have attempted to judge the potential productive capacity of a cow by her physical appearance. Between 1850 and 1890 a controversy raged in the state concerning the value of the so-called "Guenon system." The theory back of this method was that "the ovals on the udder or the mode in which the hair on the escutcheon runs indicate the value of the cow." The escutcheon, or scutcheon, is the patch of skin that is covered with upturned hair extending from the udder upward and laterally over the thighs. It was stated, "The surface or extent of the scutcheon indicates the quantity of milk the cow will produce; the fineness of the hair indicates the quality (butter fat) of the milk." Guenon indicated ten classes of escutcheons, or "mirrors," but eventually no less than sixty-four different types were recognized by devotees of the system.

The introduction of the Guenon system into Pennsylvania was described by George Blight in 1885: "In 1849, a German by the name of Nefflin was introduced to the [Philadelphia] Society at one of the regular meetings. He claimed to have a perfect knowledge of the cow, and to be able to distinguish her character; whether she be a milker or no. This he called 'the Guenon system of judging cows'. . . . A committee was appointed to visit with him the dairies in the neighborhood of the city, and it was surprising with what accuracy he portrayed the character of every cow."[35] This method was developed by M. Francis Guenon of Liborne, France, about 1840. In 1853 his book describing the method, "A Treatise on Milch Cows," was reprinted in America.

The Guenon system had many enthusiastic partisans and fully as many violent opponents. The acrimonious controversy raged for twenty-five years. "How is it," argued a Chester County farmer in 1850, "that the best marked cows according to Guenon's rule always bring the highest prices at public sales and are always sold by the owner as the best cows he has?" In 1852 the editor of *Pennsylvania Farm Journal* smugly remarked, "In this, probably the best dairy district in the Union, and which has contributed to make the excellence of Philadelphia butter proverbial, [the Guenon method of choosing milch cows] is *believed* in *fully* and practised by some of our largest and best dairymen. . . . That it should *appear* absurd . . . as regards the connection between certain quirls of the hair and the capacity for deep milking, is no argument when arrayed against *facts*. Some of our friends have proved it fully."[36] A year later he asserted, "Guenon's system is one of the most valuable discoveries of the day to the farming community, and when widely known throughout our state, will produce in the aggregate an enormous saving of expense, in rearing and keeping poor milkers. . . . The correctness of the system has been fully verified."[37] In 1853 a committee of the Philadelphia Society for Promoting Agriculture reported, "After a full and particular investigation, carried on in the most searching manner, and sharpened by incredulity, the Committee have no hesitation in . . . expressing their concurrence in the views of Guenon."[38]

A quarter century later, in 1878, adherents of the Guenon system still were vocal. At a meeting of the State Board of Agriculture on January 2, 1878, Governor Hartranft appointed The Pennsylvania Guenon Commission of which George Blight was chairman, "to inquire into the report upon the reliability of the Guenon or escutcheon theory for selecting milking stock." On November 1, 1878, the commission reported that it had "examined two hundred cows, heifers, and bulls, and the result of their examinations has been to convince themselves and others of the merits of the system, of its exceeding value to the practical farmer."[39] In 1883 it was asserted, "The Guenon system . . . has of late years become so universally accepted that no intelligent farmer can afford to remain ignorant of its advantages and principles."[40] It was further stated, "No animal of any importance is now advertised for sale without stating what grade of escutcheon it bears."[41]

Skeptics were not lacking. Among these was Eastburn Reeder of Bucks County, a prominent dairyman and long a power in the State Board of Agriculture. In 1879, after an extended personal investigation, he said, "I have seen good cows with good escutcheons, and good cows with poor escutcheons; and I have also seen poor cows with poor escutcheons, and poor cows with good escutcheons, in so many cases that the system cannot be relied upon."[42] In 1886 the State Board of Agriculture made a comparison of the escutcheons of a large number of cows with their actual milk yields and reached the conclusion, "None of the indications laid down by the Guenon system, taken singly, is infallible evidence of high yield." The introduction of the Babcock test soon thereafter, together with the more general use of milk scales, silenced former adherents of the Guenon system.

DISEASE CONTROL

The livestock industry of Pennsylvania has been the beneficiary of one of the most effective publicly-supported disease control programs in the Union. This has been responsible, in no small measure, for the remarkable development of dairying since 1870.

The first cattle disease to cause serious concern was pleuro-pneumonia. About 1862 dairy farmers near Philadelphia complained about a "murrain" which was devastating their herds.[43] According to *Farmer and Gardener*, "[Near Philadelphia] the disease had committed great ravages; one man was reported as having lost his entire herd of sixty cattle. . . . The disease had evidently become an *institution*, and was looked upon with apathy, . . . as an evil to be endured, which will have its course and then disappear."[44] The disease, however, continued to take heavy toll. In 1878 the State Board of Agriculture appropriated $200, or as much of it as was necessary, for an investigation of epidemic or endemic diseases among domestic animals, chief of which was pleuro-pneumonia. This was the first appropriation of State funds for the control of livestock diseases.

The first act of the General Assembly for this purpose was approved May 1, 1879; it was entitled "An Act To prevent the Spread of contagious or infectious pleuro-pneumonia among the cattle in this State."[45] The administration of the law was assigned to the State Board of Agriculture, which quarantined many infected herds. Later the Bureau of Animal Industry of the United States Department of Agriculture cooperated with the state in stamping out the disease. The last animal infected with pleuro-pneumonia was slaughtered in 1892 in New Jersey.

Serious loss of animals from bovine tuberculosis began to be noticed about 1880, although this disease had been present in herds for many years. In 1886 the Secretary of the State Board of Agriculture said, "We have again to report the gradual but steady increase of tuberculosis . . . among the dairies of the State. . . . This disease exists to an extent unsuspected even by the owners of the infected herds . . . In one locality in Lancaster county, a whole neighborhood may be said to be infected. . . . The cases in which [the diseased] animals have been put into the market are . . . numerous. . . . By some it is claimed that [the disease] is conveyed from the animal to the human race by the milk and flesh of the diseased animals."[46] The act of May 9, 1889, "To prevent the spread of contagious diseases among live stock," extended the provisions of the act of May 1, 1879, (for the suppression of pleuropneumonia) to all contagious diseases of livestock. It empowered the Secretary of the State Board of Agriculture to impose quarantines and to require the slaughter of infected stock.[47] Little control was exercised, however, until after the organization of the State Livestock Sanitary Board in 1895.

The basic research necessary for control of bovine tuberculosis was done by Koch, a noted German bacteriologist. In 1882 he isolated the tubercle bacillus which bears his name, and devised a test for its presence in livestock. This test was first described in Pennsylvania by H. P. Armsby in 1892.[48] A proposed act for the eradication of bovine tuberculosis was presented to the legislature that year by the State Board of Agriculture but failed of passage.

The first use of tuberculin in the United States on an entire herd as a diagnostic agent for bovine tuberculosis was by Dr. Leonard Pearson, Professor of Veterinary Medicine at the University of Pennsylvania, on March 16-17, 1892. He was well qualified, having studied in Germany under Koch. Tuberculin secured from Germany was administered to seventy-nine head of registered Jersey cattle owned by

Dr. Leonard Pearson, first user of the tuberculin test in Pennsylvania

Joseph E. Gillingham of Villa Nova. Fifty-one of the animals reacted. The owner consented to the slaughter of the reactors in order to check on the reliability of the test. The *post-mortem* revealed lesions in every reactor. Lt. Col. Clarence J. Marshall, who was present on this epoch-making occasion, thus describes it: "Many noted people were present. Among them were newspaper men, livestock men, gentlemen farmers, plain dirt farmers, doctors, sanitarians, veterinarians, etc. Pearson, the hero of the day, was twenty-four years old and looked no older than a school boy. . . . Each animal was in prime flesh, well groomed and would have been a credit to any herd or livestock show. Nobody would suspect anything wrong with the health of such fine appearing animals. . . . The disease was found in every animal."[49]

The next large condemnation of infected animals followed the voluntary testing, in 1892, of the dairy herd of the State Hospital for the Insane at Norristown. Of 183 animals tested, 135 reacted; and these and twelve others were slaughtered.[50] More fortunate was The Pennsylvania State College, which had its entire herd tested by Dr. Pearson in 1892. Only five animals reacted and the post-mortem confirmed the test. Twenty per cent of more than 500 animals in the vicinity of Philadelphia tested by Dr. Pearson in 1892 reacted.

These results created widespread discussion and concern, not only among farmers but also among milk-consumers. Little was done, however, until after the organization of the State Livestock Sanitary Board on May 21, 1895, the first such agency in the country. The Board was composed of the Governor, Secretary of Agriculture, Dairy and Food Commissioner, and State Veterinarian. On January 1, 1896, Dr. Pearson was appointed State Veterinarian. He immediately began to apply the tuberculin test to herds at the request of the owners and at the expense of the State; it was optional, not obligatory. During the year 1896 the test was administered to 432 herds comprising 5,430 cattle; about twenty-two per cent reacted.[51] According to the State Secretary of Agriculture, John Hamilton, "When the . . . State Live Stock Sanitary Board took charge of the works, it was found that fully 25 per cent. of the herds of cattle in the State were infected with tuberculosis."[52]

Thereafter the program for tuberculosis control was pressed vigorously and effectively. As summarized by Dr. C. J. Marshall in 1919, the Pennsylvania Plan of bovine tuberculosis eradication was originated by Dr. Leonard Pearson in 1896 and was adopted by many other states. It provided for testing at the expense of the State; segregation and quarantine of reactors from healthy animals or, if slaughtered, payment by the State to the owners of $25 for grade animals and $50 for registered animals; and for the testing of all animals coming into the State. In 1897 Dr. Pearson secured the first State appropriation for indemnifying farmers whose cattle had been slaughtered as a result of the test. Funds for the payment of indemnities have been made available ever since. In 1897 a law was enacted requiring all cows and breeding stock brought into the State to be inspected and tested at point of entry by the Livestock Sanitary Board or to have a certificate of freedom from contagious diseases from the state sanitary officer of the state of origin.[53]

In his report for 1899, Dr. Pearson summed up the situation: "Some herds [in the older dairy districts of Pennsylvania] are infected to the extent of 30 to 100 per cent., other herds contain few infected animals, and others—the great majority—are free from tuberculosis. Of all of the cattle in the State the number of those infected appears to be between 2 and 3 per cent. . . . Up to this time [from 1895 to 1899] the number of cattle tested . . . is 33,147, of which 4,561, or 13.7 per cent., were tubercular."[54]

In administering the tuberculosis control program Dr. Pearson met strong opposition, not only among farmers but also among veterinarians. Some highly reputable veterinarians were opposed to it. In 1902 one of these said, "[The tuberculin test] has caused . . . the slaughter of animals without number that never should have been slaughtered. . . . It is admitted that tuberculin aroused latent germs. . . . It has been proven . . . to work against the cattle interests in every state which has tried to stamp out . . . the disease by the use of tuberculin. . . . A few more years will show to the world the folly of its use."[55] The other extreme in point of view was represented by an eminent English scientist who said that probably more deaths occurred each year through drinking tuberculous milk than would be caused by England's going to war with a first class power. The danger to human health from using the milk or meat of tubercular animals was the chief incentive to public support of the eradication program. This danger was denied by some. Not until after 1900 were these issues clearly defined.

Although pleuro-pneumonia and tuberculosis were the chief concern of dairymen between 1840 and 1900, other diseases thrust themselves to the fore from time to time. In 1875 it was reported to the State Agricultural Society that Enos Barnard of Chester County "had lost as many as thirty or forty calves a year in his dairy [from abortion], but that latterly he had made it a point to be always present when the cows are housed and see that they are treated kindly and had consequently only four cases of abortion, last year."[56] Manifestly this was not contagious abortion or Bang's disease. In 1884 the Secretary of the State Board of Agriculture stated, "During the past year [1884], the attention of the Board has repeatedly been called to the increase of abortion among the dairy stock of the State. . . . [The Board is convinced] that no law could be framed which will be of any real benefit."[57] An outbreak of the dreaded foot-and-mouth disease occurred at Oxford, Chester County, in 1888 in a shipment of Guernsey cattle from Europe, but it was quickly brought under control.

The establishment of the School of Veterinary Medicine of the University of Pennsylvania in 1883 was a high point in the history of the livestock industry of the State. There was pressing need for relief from the ministrations of quack "horse doctors." The gross ignorance of many of these practitioners was appalling. In 1860 *Farmer and Gardener* quoted the advertisement of one: "The under sind lat from Chester conty Entends follown *DOCTERN HORSES* & stock of all Kinds he has had agreat deal of practs among Sick horses & stock & flaters him Self able to Master Most all deases & complants among horses. Pleas giv Me a call & if no cure no pay Except for medison if bought by Me. . . ."[58] The editor of this journal was a persistant advocate of the founding of a veterinary college. In 1860 he said, "We take pleasure in announcing that the Veterinary College of this city will commence its winter season for 1860 on the second week of November." Evidently this venture failed, for a year later he said, "Several well meant and vigorous, but finally abortive attempts have been made to establish a good Veterinary College in Pennsylvania, and from present prospects there is little likelihood that the attempt will be renewed, or if renewed, that it will meet with any better success."[59] But seed had been sown on fertile ground and eventually it came to fruition.

FEEDS AND FEEDING

In the early days of dairying feeds were very limited in variety; they were mainly corn and oats chop, corn stover, and hay. Wheat bran was not available in quantity until after 1860. "About 1850," said a Pennsylvania dairyman, "our farmers fed their cows fifty cent corn with a nutritive ratio of 1 to 16, producing from 3,000 to 4,000 pounds of milk per head per annum. Meanwhile they let $20 per ton bran, with a nutritive ratio of 1 to 4, which would have produced from 600 to 800 pounds more milk per head, run down the tail race of the old mill dam."[60] The feeding value of wheat bran and middlings was not generally recognized until after 1870; these materials were dumped into the Mississippi River by the flour mills of Minneapolis and St. Paul.

Practically the only succulent feed was green pasture grass. When the pasture was short or dry the milk flow dwindled. A few farmers grew rutabagas or sugar beets for winter succulence, but the large amount of labor required for the successful production of these root crops was a deterrent. In 1871 the cows of Edwin Satterthwaite, a noted dairyman of Montgomery County, were fed, besides hay, equal parts by weight of corn meal and bran, about two quarts of the former and four of the latter twice a day, together with about a peck of cull roots—beets, carrots, turnips, parsnips.

As the years passed, other feeds were added to the bovine bill of fare; chief of these were dried brewers' grains, gluten feed, and wheat and buckwheat middlings. Patent feeds began to appear about 1890; two of the earliest were cerealine and Quaker oats feed. There was no law providing for inspection of stock feeds. By 1900 many brands were on the market, some grossly fraudulent. Most of them were by-products in the manufacture of flour, starch, glucose, cotton seed oil, and linseed oil. By 1895, under the leadership of Henry P. Armsby of The Pennsylvania State College, whose *Manual of Cattle Feeding* was widely used, the terms "feeding standards" and "balanced rations" were part of the vocabulary and practice of progressive farmers.

Dairy cows gleaned most of their livelihood from the fields; only a few dairymen practiced soiling, or growing a succession of green forage crops which were fed to confined cattle. Between 1840 and 1890 the soiling of "neat cattle" was advocated enthusiastically by a few, but the practice had many more opponents.[61] It was too expensive except, possibly, for farmers on very high priced land. "Notwithstanding the many and great benefits which have been from time to time urged in favor of soiling," said Thomas J. Edge in 1885, "the practice is not making much headway among practical farmers."[62] After 1890, when silos began to come into general use, little was heard of soiling.

The silo was of great economic advantage to the dairyman. Prior to 1880 most farmers milked their cows only during the pasture season because they thought a profit would not be made during the winter when only dry feed was available. The silo revolutionized dairying by providing cheap succulence during the winter months, thus extending the lactation period. It made dairying a year-around enterprise instead of a summer enterprise only.

What was said to have been the first silo in America was built by Dr. Manly Miles in 1875. He followed the pattern of those built previously in France and Germany. These were merely square or rectangular pits, often lined with stone or concrete and covered with soil. In 1876 Francis Morris of Howard County, Maryland, dug such a pit and filled it with whole corn plants. In 1877 M. August Goffart, a French farmer, published a book reporting twenty-five years of experience with silos; this became the basis of early American attempts in this direction.[63] According to a speaker at a meeting of the State Dairymen's Association in 1881, "Mr. John M. Bayly, of Billerica, Mass., . . . in 1879 built and filled the first silo in America. Since that time there have been several, perhaps twenty-five, silos built in this country."[64]

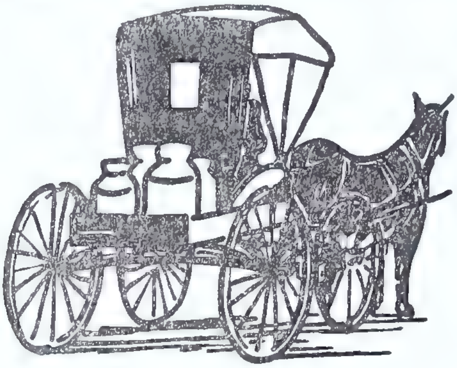
Probably the first silo to be built in Pennsylvania was that of P. R. Stetson of Berks County, in 1880. By 1885 there were nearly 2,000. All the early silos were built below ground; they were shallow "cellar mows." By 1887 most silos were built above ground of wood, and the silage weighted with a covering of dirt or sawdust.[65] Round silos did not come into use until after 1890. By 1900 most farmers had found it more economical to purchase ready-made silos that were erected by the manufacturers than to build them themselves.

Many of the early silos were unsatisfactory; there was much spoilage. Some farmers could not bring themselves to feed ensilage; they said such sour stuff was not fit to feed; it would taint the milk. Even some professors at the State Agricultural College, where leadership in new fields was to be expected, were skeptical. Said Professor of Agriculture W. H. Jordan in 1882, "Ensilage is not a necessity for securing the healthfulness or vigor of animals, for a variety of food can be obtained more cheaply in other ways. Then why all this excitement over silos. . . . Certainly the farmer who preserves grass in silos, and so handles three tons of water several times in order to feed his cattle one ton of dry substance has lost his judgment."[66]

In spite of its critics the silo gained steadily in popularity. In 1888 the Secretary of the State Board of Agriculture said, "After the reverses which followed the first introduction of ensilage, our farmers are again investigating into its merits."[67] By 1900 it was firmly established in Pennsylvania farm practice, but unjustified objections to it were raised for some years thereafter. In 1898 the milk inspector of Meadville issued an order prohibiting the feeding of silage to cows supplying milk to that city.

CARE OF MILK

Prior to 1880 women did most of the milking. The dairy was almost as much their domain as the kitchen. "From the derivation of the word dairy," said Willis P. Hazard, "woman has a right as queen of the dairy to be associated with it and its products. For dairy is the *ry* or *rie* or dominion of the *dey* or farm woman."[68a] The farmers' wife milked, lifted heavy crocks in the springhouse, skimmed off the cream, churned, worked and packed the butter, and usually took it to market, in addition to her other multifarious duties as a mother and housewife.



Hauling milk to the creamery, 1900

In 1871 a Pennsylvania contributor to *Practical Farmer* said, "A very common plan in this section is to have a tenant house over the spring house wherein a man and his wife reside. The man works on the farm and his wife, with some help at milking time, undertakes to perform the whole dairy business, receiving for pay so much per pound of butter made, usually three or four cents. The owner of the farm has only to back his Dearborn up to the springhouse once or twice a week to take the butter, already packed in tubs with a receptacle for ice at each end, to the railroad station."[69]

Little attention was paid to sanitation. A cheese factory manager describes conditions in Crawford County in 1879: "Cows . . . are obliged to lie down in the filth which accumulates in stables every night through our long and dreary northern winters, and, when springtime comes, she goes forth to pasture with her hips, sides, and udder loaded with filth which required not only the gentle rains of spring, but far into summer to eradicate. People who are so negligent . . . generally do their milking out of doors, . . . in rainy weather, the drippings from the cows falling into the milk."[70] After 1890 such primitive conditions did not prevail in most of the dairies of the State. Some years ago, said a dairyman in 1885, "cows and other cattle run loose together [in the milking yard], and hired girls and hired men and boys milked the cows in mud and filth much of the time."[71]

Crude milking machines appeared about 1875, but the early models were not efficient. The Durand milking machine of 1879 was worked by a hand crank and balance wheel and was said to milk twenty-five cows an hour.[72] Mechanical milkers did not come into general use until after 1900, when electric power was available on the farm.

Until after 1880 most milk was made into butter. Prior to 1840 it was set in heavy earthenware crocks for the cream to rise. These commonly were nine inches wide at the base and twelve to fourteen inches at the top and had no handles. The interior was glazed but not the outside. The heyday of these "Dutch potteries" had passed by 1850, but some were in use until 1880. They were replaced by light, eight-quart tin pans from which the cream was skimmed with a tin skimmer. The open-pan system of cream raising required many utensils and much labor, and there was a considerable loss of butter fat. A few dairymen set their milk in large shallow vats.

The springhouse, with its rows of earthen crocks or shining tin pans, was an almost inseparable adjunct of dairying until after 1890. How many thousands of weary steps the farm woman took down the steep and often slippery path to the springhouse at the foot of the hill! The temperature of springhouse water was commonly 54° to 56°. Much springhouse butter was excellent, but there was considerable ill-flavored cream and butter, especially during "dog days." Some springhouses were quite elaborate. In 1853 the Chester County Agricultural

Society awarded a premium to Samuel J. Dickey and Brothers of Hopewell for their efficient dairy: "Their Spring House is situated over a never failing spring, built of brick, some 50 to 60 feet long, 14 feet wide, with a high story, all plastered, ceiled, white coated. . . . [It] is kept to a proper temperature in cold weather by artificial heat. . . . Their cow house is adjoining the barn some sixty or seventy yards from the spring, in which their cows, some forty in number, are tied by chains in stalls. . . . The milk is . . . strained into two large cans and conveyed by railroad to the spring, where it is put into pans to cool."[73] A few farmers had a dairy room attached to an ice house and cooled the water with ice.

Some housewives, especially those who depended on cold well water instead of spring water, set their milk in the cellar for the cream to rise. The cellar had to be cool and dry and have free circulation of air. Shallow milk pans were placed on stone slabs and stood in a few inches of water. After 1875 some large dairymen used the "deep can" or "Cooley System" of raising cream. Large tin cans were submerged in water which was kept at a temperature of about forty-four degrees with ice. There was less loss of butter fat than with the shallow-pan system, but the method was expensive.

The centrifugal cream separator was invented by Carl Gustaf Patrick De Laval of Stockholm, Sweden, in 1878. It revolutionized the dairy industry. Separators were first used in Pennsylvania in 1883. They were not only labor-saving but also more efficient; they took out all the cream, not merely three fourths, and at any desired degree of thickness. A pound of butter could be made from eight and half quarts of milk, whereas from ten to eleven quarts of the same milk were required in the shallow pan or deep setting methods. At first only large machines were made; these were used mainly by creameries, not by individual farmers. Dairymen took their milk to these plants and got back their quota of skimmed milk from a common tank. By 1895 small hand separators adapted for use on the farm were in common use. They made it possible to feed fresh skimmed milk to pigs and calves and obviated the necessity of hauling whole milk to the creamery. Other important developments in the care of milk were mechanical refrigeration, beginning about 1875, and pasteurization, beginning about 1893.

BUTTER-MAKING ON THE FARM

Prior to 1875, when "Associated Dairying" creameries and cheese factories began to come in, dairying was a home enterprise and was managed almost wholly by farm women. Most of the milk not needed for home use was converted into butter.

A Dauphin County farmer describes the farm butter-making of his boyhood, about 1840: "Butter making did not constitute a business in itself because it formed one of the many smaller . . . industries to be found on every farm at that time. In every village or small town not exceeding a population of 2,500 to 3,000 souls, the possession of a cow by each well-to-do family was quite common. In such towns there was no place for a milk dealer. Each family who did not have its own milk supply, sent to a neighbor. . . . Every farmer kept a few cows, but no farmer kept a large herd. Butter was made, sufficient for the family use and, for at least a part of the year, the housewife would have a few pounds each week to exchange at the neighboring store for coffee, sugar, or such other groceries or dry goods as were needed. . . . Shallow pans about 13 inches in diameter were filled with milk to the depth of about two inches. . . . [The cream] was skimmed off and transferred to a stone jar where it was allowed to ripen until a sufficient supply had collected to form a churning. . . . Butter made in this manner varied greatly . . . in color, consistency, and flavor, and large quantities of butter that would now be considered unfit for a retail market were consumed."[74]

In 1849 a Lancaster County farmer described dairying in that county: "Farmers here keep from 4 to 12 cows, . . . and keep the milk in a cool spring-house in summer, and, during cold weather, in a heated room; the cream is taken off as soon as it becomes sour, and kept in large crocks from 3 to 6 days; it is then churned, and the butter washed in cold water till the buttermilk is all out; it is then lightly salted. . . The farmers' wives usually take it to market or exchange it for groceries as soon as made, and the country storekeepers resalt and pack it in small firkins, to be sent to other markets."[75] On many farms, especially those at considerable distance from town, butter was "put down" during the summer in oaken or hemlock firkins as soon as made and covered with brine. The firkins were stored in the cellar until winter, when the output for the entire year was sold. It was the pride of a housewife to make butter which would keep sweet for at least a year.

For many years Philadelphia was noted for the excellence of its butter. "Philadelphia prints" from Chester, Delaware, Bucks, and Montgomery counties commanded the highest price in the Philadelphia, Wilmington, and Baltimore markets. Until after 1850 public transportation facilities were poor and commercial dairying was profitable only within horse-driving distance of the market. "The best butter," boasted a contributor to *Farmers' Cabinet* in 1844, "is to be had only *in Philadelphia*. . . . [It has] a *richness and fine flavour,* altogether exempt from any rancidity, acidity, or *tallowy taste,* not to be met with . . . either north or south of that city. . . . Is it not that there is something peculiar in the pastures in the neighbourhood of Philadelphia, which affects the quality of the lacteal secretions? . . . The best Philadelphia butter comes from cows that graze on the old *meadows below it*."[76] It was thought by some that the sweet vernal grass in these pastures favored the production of high quality butter; but in fact, the superiority was due to the high nutritive quality of the bluegrass and white clover in these pastures, together with cleanly methods of manufacture on the farm.

This point was emphasized by the editor of *Lancaster Farmer* in 1869: "They bring in their butter in a showy and attractive condition. . . . A large tin vessel, designed expressly for business, has chambers at each end, into which ice is put [and] wooden shelves, about three inches apart. . . . The tin, with ice in each end, is then set in a wooden tub which has been cooled with ice or spring water. Over this is drawn a cover of padded carpeting, with oil-cloth on the top. Thus hot air and dust are wholly excluded, and the butter rides to the city and opens in the market-house in as fine condition as when packed in the spring-house. . . . No wonder the Philadelphians would rather pay seventy-five cents than go back from such manna. . . . Of course, everyone knows that 'Philadelphia' butter is not made *in* Philadelphia. All the adjoining counties, and indeed most of the counties of the State, contribute their quota. And of course *we* all know the secret, which is little more than scrupulous cleanliness, and conscientious industry in working out all the little details."[77]

There were a few large dairies near Philadelphia. In 1854 Samuel J. Dickey and Brothers of Hopewell, Chester County, used "one of Copes' 150 gallon churns, propelled by horse power. . . . [The butter] is packed into square tubs . . . for the Baltimore market. . . . Butter made from Oct. 1st 1852, to Oct. 1st 1853, [was] 5,990 lbs., which was sold in the Baltimore market for an average of thirty-one and three-quarter cents per pound, from which deduct four and a quarter cents for commissions, freight and hauling."[78]

In 1871 Edwin Satterthwaite of Montgomery County was awarded a premium by the Philadelphia Society for Promoting Agriculture for the superior quality of his butter. He described his method as "substantially the same as is pursued by the best butter-makers of this entire section. . . ." The milk was kept in pans in a well ventilated room at a temperature of about sixty degrees. About a tablespoonful of sour milk was put into each pan at the time it was set away. After standing thirty-six hours the milk was skimmed. The cream was kept at a much lower temperature in cans sunk in water. It was slightly colored with the juice of grated carrots before churning. With the first working out of the buttermilk, salt was added; about an hour later a second working was given and the butter was weighed into pound lumps, shaped, and printed.[79]

Different types of churns were used, the most common being the upright or "dasher" churn and the barrel churn. In large dairies these were worked with dog or horse power. Fresh print butter was commonly taken to market twice a week, each pound being wrapped in white muslin cloth. About 1875 middlemen or hucksters began to make weekly visits to farms near cities to collect butter for market.

Philadelphia "gilt-edge" butter had an enviable reputation until about 1890; then market milk began to supersede it. Around 1860 to 1870 certain brands of Chester County butter, as "Darlington" and "Sharpless," sold for $1.00 a pound.[80] Considerable excellent butter was made in outlying districts as well as near Philadelphia, particularly in Bradford County; but much of the "country" butter was poor indeed, especially that which had been salted down in firkins during the summer. In 1855 James H. Gowen stated, "This type of butter scarcely averages eight cents a pound and a considerable proportion of it sells for five or six cents a pound for grease." Country butter "came" in a greasy mass, not in granular form, and was very variable in color. When the country storekeeper took it in trade he dumped the butter from all his patrons into a barrel; this "marbled" butter was bought by a huckster who hauled it to a renovating plant. "Renovated" butter, however, still was of very inferior quality.

Butter making on the farm reached its height in 1880, when 79,336,000 pounds were produced. Thereafter factory manufacture began to displace farm manufacture, and market milk became relatively more important. The rise and decline of butter making on the farm is indicated in census statistics for certain counties:

County	*1850*	*1880*	*1890*	*1924*
Chester	2,092,000	4,247,000	1,628,000	146,000
Delaware	1,342,000	1,428,000	399,000	77,000
Lancaster	1,908,000	3,381,000	3,064,000	1,287,000

Since 1890 Lancaster County has led in the production of butter on the farm.

By 1890 long rows of shining tin pans seldom were seen sunning in rural door-yards. The hand churn still is used in some farm homes to make butter for family use but the emancipation of farm women from commercial dairying now is about complete.

CHEESE FACTORIES

Factory manufacture of butter and cheese, as distinct from farm manufacture, was born at Rome, Oneida County, New York, where Jesse Williams built the first cheese factory in 1850. The real seed ground of the industry, however, was Herkimer County, New York, where a number of cheese factories were built after 1857. The first butter factory, more commonly called a creamery, was built by Alanson Slaughter near Wallkill, Orange County, New York, in 1861. During the early years of their operation it was common for both butter and cheese to be made in the same factory but at different times. This "Associated System" of dairying, also known as the American or cooperative system, revolutionized the dairy industry. Among other changes effected, it relieved the farmer's wife from the laborious and exacting work of the dairy.

Cheese had been made on farms, mainly for home use, since the settlement of the colony. In 1850 Chester County led in cheese production with 33,000 pounds; in 1870 Lancaster was first with 82,000 pounds. The implements, including tubs and presses, were home-made and crude and the product was very variable in quality. The post-Civil War inflation period gave impetus to the commercial industry.

Organized cooperation among Pennsylvania dairymen began in 1864 when a cheese factory was established at Springville, Susquehanna County.[81] Soon thereafter factories were built at Bridgewater, Gage, and New Milford in the same county. Levi Wells built a cheese factory at Spring Hill, Bradford County, in 1866.[82] The number of plants increased rapidly, especially in the northwestern counties; by 1870 there were "nearly one hundred factories in active operation [in the counties of Erie, Crawford, and Mercer], each receiving the milk of from 200 to 600 cows, some factories making daily from twenty to twenty-six cheeses of an average weight of sixty pounds."[83]

For a few years the infant cheese industry experienced flush prices. "The London market," says Levi Wells, "fixed the prices on cheese for the markets of the world. England took all of our surplus and paid . . . in gold, and the more our currency depreciated and the higher the premium on gold, the higher went the price of cheese. . . . The average wholesale price [in 1866] was a small fraction under eighteen cents per pound, . . . an equivalent of about forty-five cents a pound for butter."

Although the manufacture of cheese was more profitable than the manufacture of butter for several years, nevertheless far more butter was produced than cheese, even in the three northwestern counties which had gone "cheese crazy." In 1870 the relative production was:[84]

County	*Number of Cows*	*Pounds of Butter*	*Pounds of Cheese*
Crawford	24,247	2,046,262	196,039
Erie	20,140	1,896,701	165,739
Mercer	15,507	1,516,067	101,530

The main reason for the preponderance of butter, even during flush times in the cheese market, was set forth by a Crawford County man in 1878: "In the factory plan of butter making, the butter is made from sour cream, and the milk utilized in the piggery. Our present method consists in making sweet cream butter, and using the milk in the manufacture of skim cheese. Half of the butter made in this section is of a very inferior quality, and at least one fourth of it is more worthy of being called grease than butter."[85]

Spurred on by the Pennsylvania Dairymen's Association, which was organized at Meadville in 1871 as the Crawford County Dairymen's Association, cheese factories spread throughout the northwestern counties. Dairymen rode the wave of fictitious post-war prosperity. In 1876 it was stated, "The dairy interest . . . is represented in this [Meadville] section by 101 factories . . . and furnishes the main income of 5,000 of our farmers. These factories are supplied with the milk of 30,000 cows, aggregating 96,000,000 pounds of milk, from which is produced 9,600,000 pounds of cheese, . . . or 500 car loads [a year]."[86]

Cheese factories commonly were open during the pasture season, from March to November. Farmers contended that they could not produce milk at a profit during the winter, being without succulent feed. In 1875 the Pennsylvania Dairymen's Board of Trade was organized at Meadville; this was a clearing house which kept factorymen posted on market conditions, but there was no cooperative marketing.[87] The first dairy fair in the United States was held at Meadville on October 23-25, 1877.[88] It was sponsored by the Board of Trade of Meadville and was a signal success. There were competitive exhibits of cheese and butter from eight states.

A large proportion of Pennsylvania cheese was exported. Americans never have been cheese eaters to anything like the extent of the French and other continental Europeans; they prefer butter and whole milk. For a short period Crawford County cheese had an enviable reputation on the market and that county prided itself on being the center of the dairy industry of Pennsylvania. The programs of the State Dairymen's Association were devoted almost wholly to cheese, to the practical exclusion of butter and whole milk. During the period of post-war inflation, from 1865 to 1875, the price of both butter and cheese was high. Fancy butter sometimes brought $1.00 a pound and averaged forty-five cents. Cheese brought eighteen to twenty-five cents a pound. Dairymen were in a sanguine and expansive mood.

The crash came in 1878. In 1879, viewing the depressing scene, a discouraged dairyman remarked, "For the first time in twenty years dairymen have been made to feel the extreme pressure of low prices. Although depression was felt in many branches of business in 1875, it did not touch the dairy, for cheese that year averaged, in January, 15¾ cents. . . . Dairymen had good reason to congratulate themselves on the prices received for their product up to the time when they began to market the crop of 1878."[89] In that year it was difficult to market cheese at five cents a pound.

The causes of the disastrous slump in the cheese industry were not only the general economic depression but also unsatisfactory conditions within the industry itself. In 1881 a dairymen appraised the situation thus: "Dairymen have almost brought ruin on their own industry . . . [by trying] to learn how much cream could be taken from the milk, and yet make a cheese fit for human food, hence the foundation of oleomargine butter and lard cheese was laid."[90] The poor quality of skimmed cheese was largely responsible for the loss of the export market. Factorymen skimmed off the cream to make butter and made "white oak cheese" of the skimmed milk and buttermilk. Sometimes cheap fats, as lard and unmerchantable butter, were substituted for butterfat. This "filled cheese" and skimmed cheese soon ruined the foreign as well as the domestic market. Not until 1897 was there a State law regulating the marking of cheese; five grades were established —full cheese, three-quarters cream, one-half cream, one-quarter cream, and skimmed cheese.

Another reason for the slump in the market for Pennsylvania cheese was unsanitary conditions in the factories. Those that sprang up during the flush period were mostly of crude construction and poorly equipped. They accepted milk that had been produced under very unsanitary conditions. Cheese made from it could not meet the sharp competition for the limited export trade from Wisconsin and other western states where much higher sanitation standards prevailed.

After 1880 butter making began to displace cheese making; by 1885 creameries had almost completely supplanted cheese factories. Low prices for both cheese and butter continued for several years and completed the demoralization of the cheese industry.

CREAMERY BUTTER

Even during the period of fervid cheese production, from 1865 until 1878, much more butter was made than cheese. There were few cheese factories in the eastern counties; the emphasis in associated dairying there was on butter. Several creameries were established in Bucks County in 1879; by 1881 nearly 100 were operating in Bucks, Montgomery, Chester, and Berks counties. In 1885 there were thirty-five in Bucks County alone. Between 1890 and 1900 the number of creameries in Pennsylvania more than doubled. The advent of the centrifugal cream separator and the Babcock test were a stimulus to the creamery movement.

In 1881 Eastburn Reeder of Bucks County stated the main advantage of the creamery system: "It takes all the labor connected with dairying away from the house, and transfers it to the creamery. To the farmers' wife and daughters it had the effect of an emancipation proclamation from the toil and servitude of dairy bondage. They no longer have milk to strain and carry away to the milk cellar; no milk to skim; no pans to wash, scald and sun; no butter to salt, work, and print. The labor that formerly occupied the women upon thirty or forty farms for a considerable portion of every day in the week, . . . is performed by a few men [in the factory]."[92]

Creamery butter was somewhat superior in quality to most farm-made butter. Much of it, however, was inferior to that made in Wisconsin, Ohio, and Michigan creameries, primarily because of lower standards of sanitation on farms.

Pennsylvania creamery butter had an unenviable reputation on the market until after 1900. In 1898 it was stated, "In nearly every large town in the state the butter dealers are obliged to get the butter for their high-class trade from the West, while production of cheap, low priced butter in the state is 70,000,000 pounds per year, a large part of which is evidently sold for grease, baker's stock, or is made into process butter."[93] Butter produced on the farm continued to exceed that of creameries; in 1900 only one-third of the butter was made by creameries.

Creameries were of two types—cooperative and privately owned. In the former, a number of farmers living within a radius of four to six miles organized a stock company, each furnishing capital in proportion to the size of his dairy, perhaps at the rate of five dollars a cow. Co-operative creameries predominated at first, but after 1890 they gradually gave way to individual or corporate ownership. In 1915 a Tioga County farmer stated, "There was a time when we had, all over that county [Tioga], . . . small creameries run by the farmers . . . ; [and] cheese factories. . . . About 15 years ago some corporations crept in there and set up a skimming station, a butter factory, a powdered milk factory, two or three milk condenseries. . . . They had our little creamery, . . . our little skimming station . . . our cheese factory all destroyed; we have nothing; we are just simply at their mercy."[94]

The promotion of cooperative creameries became a fraud. In 1897 N. B. Critchfield of Somerset County related how unscrupulous men took advantage of farmers: "In 1893, men who were engaged in incorporating dairying companies, came into our county and established a number of creameries. I believe today (1899) not one is in operation. . . . The stock originally . . . was $50 a share. It was bought up at from $2 to $5, and some as low as $1. . . . Yet, notwithstanding . . . their experience, another set of men have come in within the last year, and . . . established a number of creameries at from $4,000 to $5,000 each, that ought [to have cost] not exceeding $2,000 each. . . . If farmers want to establish a [cooperative] creamery . . . they ought to do it themselves."[95]

In the early days of creameries farmers hauled whole milk to them daily. This was an onerous chore when horse-drawn vehicles were used, even though creameries usually were located so that the average haul was not over three miles. It took both horse and driver away from regular work on the farm; and in hot weather the quality of the milk suffered. Some farmers employed a neighbor to do their hauling at the rate of one cent a can per day; or several farmers took turns in hauling the daily product of all.

The introduction of the small hand separator adapted for use on the farm, about 1890, was an advantage. This was stated by Harry Hayward in 1896: "It is not without reason to suppose that . . . the milk brought to a central creamery is contaminated with tuberculous germs. The skimmed milk is all run into a common vat from which the patrons draw in common, so that any infection . . . in one patron's milk is quite apt to be taken home in the skimmed milk by every other patron sooner or later. . . . Another objectionable feature . . . which the hand separator quite effectually overcomes is the hauling of the whole milk to the creamery and the hauling of the skimmed milk back again . . . More satisfactory results . . . could be obtained in feeding calves especially, if the milk were separated on the farm."[96] It was commonly estimated that the skimmed milk from two cows would, with some supplemental feed, keep one hog. After separators were in common use on farms cream was gathered by the creamery management two or three times a week.

Before the introduction of the Babcock test creameries purchased milk by weight, regardless of the varying butterfat content. Manifestly this was not fair to either buyer or seller. Most creameries were equipped with one or more large, turbine-powered separators and a combined churn and worker. The butter was marketed in pound prints or in tubs and shipped in refrigerator cars. In 1900 there were more than 1,000 creameries in Pennsylvania; Chester County led with eighty. At that time more than three-quarters of the plants were owned by individuals or corporations and less than one-quarter were cooperative.

The peak in butter production was reached in 1900, when 111,358,000 pounds were made. Of this total, 74,221,000 pounds were made on the farm and 37,137,000 pounds in creameries. After 1900 there was a rapid decline; fluid milk was more profitable and western butter largely captured the market.

THE FIGHT AGAINST OLEOMARGARINE

The bitter warfare between dairymen and the manufacturers and distributors of various imitations of butter, particularly oleomargarine, began in 1875—and the end is not yet. In 1869 a French chemist, M. Hippolite Menge-Mowries of Paris, was commissioned by his government to develop a cheap substitute for butter that could be used in the French army and navy. On the successful outcome of his research he was granted a patent and a Napoleonic award. The base of his product was skimmed milk and animal fats. The committee that made the award recognized the possibility of unfair competition with butter and recommended that the product be not colored in imitation of butter. This policy was followed in France but not, unfortunately, in the United States.

The first patent on oleo in the United States was issued in 1871. The first factory to produce it was built in New York City in 1873. In this product the natural oil of cream was replaced with low-cost animal fats from beef, mutton, veal, and lamb. Later, vegetable oils, mainly from cottonseed, were used. Oleo had approximately the color and melting point of butter, but was inferior to it in quality. It could be made for about ten cents a pound and was sold as "oleomargarine butter."

For several years oleo was not considered by progressive dairymen to be a serious menace to their business. Said one in 1878, "Let dairymen make a grade of butter so much above oleomargarine that it cannot compete with it, and the new invention [oleo] will die out quickly enough."[97] Another commented in 1884, "The first effect of oleomargarine was far from discouraging. It came into competition only with low grades of butter, which it almost drove out of the market. . . . Then came 'butterine,' which came into competition with a higher grade of butter . . . known as 'firsts' and 'seconds,' and, owing to the competition, they are rapidly falling to the prices formerly occupied by third and fourth-class goods. . . . Nearly half the butter consumed in our large cities during the past winter was adulterated . . .; it has found its way into every town and village."[98]

In 1879, becoming alarmed at the competition of colored oleo with the better grades of butter, dairymen secured the passage of "An Act to prevent deception in the sale of butter and cheese." This was the first such law in the United States. It prohibited the manufacture and sale of oleo as butter. Some manufacturers then changed the name of their product to "butterine" or "suine" and so evaded the law. The law was amended in 1883 and again in 1885 but was not enforced.

By 1885 colored oleo had captured the low-price market. Much of it was very inferior to butter. A correspondent of a Philadelphia newspaper saw "half a ton of oleo in the Quaker City, fresh from New York and labeled 'Philadelphia Best Print.' It looked exactly like the best locally-made butter but tasted more like lard. . . . There is at least one tallow candle in every pound. It is sold for about ten cents a pound less than the best genuine butter."

Such flagrant deception and unfair competition made dairymen see red. The law directed against such deception was not enforced, partly because the State constitution forbade the appointment of inspectors or other enforcement officers. Moreover, State laws did not apply to goods in interstate commerce. In 1885 Congress passed an Act imposing a tax of two cents a pound on oleo, in addition to a license tax, and made it unlawful to sell oleo except under its own name and on its own merits. Federal legislation, however, like State legislation, brought little relief to the harassed dairymen.

The situation was chaotic. Not only was oleo sold almost at will but also there was widespread adulteration of butter. In the judgment of Eastburn Reeder of Bucks County, "The adulterations of natural butter, by the various intermixtures of lard oil, tallow oil, . . . and other foreign ingredients . . . has been practiced to such an extent and under such fraudulent cover that the spurious product has found its way into almost every town and city in the State to an amount nearly equal in quantity to that of the whole production of natural butter sold in the markets. The fraudulent imitation has been so ingeniously contrived . . . that, ordinarily, it connot be distinguished from pure butter . . . [except] by chemical analysis."[99] Most of this so-called butter was composed of about forty per cent of natural butter and sixty per cent of oleo, lard, or oil. The best grades sold for around fifteen cents a pound, which meant that only the most inferior butter and the poorest grades of fats and oils were used in making the product, after which it was deodorized with acids, flavored, and colored. At that time "bogus butter" was fully as great a menace to the dairy industry as oleo.

Some dairymen, however, admitted that there might be a place in the trade for good imitation butter. In 1884 a speaker at the State Dairymen's Association asserted, "I am forced to believe that much imitation butter . . . is entirely harmless and even wholesome in its composition. . . . The best class of artificial butter is superior in taste and appearance to the poorer makes of true butter. . . . [It] has become an economic necessity to a large class of people." But, he insisted, it should be sold for what it really was.[100]

In 1885 the State Board of Agriculture took the position that the most expedient solution of the problem was by elimination rather than by regulation. It "*Resolved*, . . . that to prevent deception in dairy products and for the preservation of the public health, the manufacture and sale of oleomargarine, butterine, suine, and other like products, should be entirely prohibited within this Commonwealth, and the General Assembly are hereby requested to enact legislation necessary to that end." The State Dairymen's Association endorsed this resolution.[101] Both groups justified this recommendation not only on the ground of unfair competition from butter substitutes but also on the ground of the preservation of public health. They pointed out that when oleo was first introduced it contained nothing deleterious, but that soon various kinds of unclean fats and oils were used, making the material unfit for human consumption. It must be admitted, however, that the opposition of dairymen to the sale of oleo and bogus butter was based more on economic grounds than on the preservation of the public health.

The counsel of the State Board of Agriculture prevailed. In 1885 the General Assembly passed a law prohibiting the manufacture and sale of oleo and bogus butter "for the protection of the public health and the prevention of fraud in the manufacture and sale of dairy products." This Act gave rise to one of the most famous cases in American jurisprudence, that of Powell vs. Pennsylvania in the Supreme Court of the United States. The law was upheld as constitutional by the Court.

As in many other instances, the mere passage of a law effected little improvement. In the absence of an enforcement officer it was practically a dead letter. The situation was complicated by conflict between the federal and State statutes. The Pennsylvania law forbade the manufacture and sale of oleo within the State, but the federal law permitted both in the inter-state commerce. With this conflict, it was practically impossible to prevent the sale of oleo. The situation grew worse instead of better.

Despairing of securing relief by action of officers of the law, on August 8, 1885, the "Farmers', Dairymen's and Creamerymen's National Protective Association" was organized at Philadelphia for the purpose of enforcing the law. In 1891 this Association collected over $9,000 from dairymen and creamerymen in and near Philadelphia to pay for legal services in connection with enforcement. In 1892 it was reported, "The Association arrested one hundred and forty-eight men for selling oleomargarine in the eastern part of the state, and [secured] the conviction of one hundred and forty-five. This has had the effect of almost driving the business out of the city of Philadelphia."[102] The enforcement program of the Association, however, was not supported financially by dairymen and creamerymen in other parts of the State. In 1892 the Association petitioned the General Assembly to establish a Dairy and Food Commission and to provide for the appointment of a Dairy and Food Commissioner under the State Board of Agriculture.[103] This law was approved on May 26, 1893, but no appropriation was made that year for salaries and expenses.

The first Dairy and Food Commissioner was Eastburn Reeder of Bucks County. It was difficult, often impossible, to secure conviction in the courts. In 1894 the President of the State Dairymen's Association stated, "'Oleomargarine, or butterine, . . . is being sold by thousands and tens of thousands of pounds in nearly every city and town as pure butter, in direct violation of our State laws."[104] In December, 1897, the Allegheny County Grand Jury ignored charges preferred by the Dairy and Food Commissioner against sixteen oleo dealers, although the evidence against them was ample. The sympathies of the court and jury were on the side of salesmen of the "poor men's butter." The daily press of that county said it would be useless to attempt to enforce the law in this area, because of its unpopularity.

Typical of many subterfuges employed by oleo dealers was that reported by the Dairy and Food Commissioner in 1895: "The first consignment of oleomargarine to Bradford county was run into a siding at Wysox, on Sunday, the first of September. . . . In a few days it was made into pound prints probably mixed with butter, and sent to market as Bradford county creamery print butter. . . . Both jobbers and retailers did not notice that it was different from [real butter]. . . . The consumers, however, detected the difference at once."[105] .

Oleo was manufactured quite extensively in the State until late in 1895, when the last factory was closed. The sale of oleo and bogus butter never was wholly suppressed, it was merely restricted. A decision of the Supreme Court of the United States in 1898 practically nullified the oleo prohibition law of Pennsylvania by legalizing the sale in interstate commerce of oleo sold to consumers in the original package. This decision affirmed that a state may not prohibit the sale of a food product but may regulate its sale in such a manner as to prevent fraud. It also affirmed that a state law prohibiting the sale of oleo colored in imitation of butter and the levy of a tax or license fee on the product for the purpose of paying the cost of enforcing a regulatory law are constitutional.

At the instance of the State Grange and the Pennsylvania Dairy Union, on May 5, 1899, the oleo prohibition laws of 1879 and 1885 were repealed and were succeeded by a regulatory law. A system of licenses was put into effect and it was required that the product be "free from coloration, or ingredients that cause it to look like butter"; and that it be labeled oleomargarine or butterine as the case might be.[106] Attempts to enforce this law were resisted by oleo manufacturers and dealers, who claimed that the anti-color clause was unconstitutional, being in effect, prohibitive and therefore in conflict with the ruling of the United States Supreme Court. In 1900 the Supreme Court of Pennsylvania upheld the constitutionality of the color clause of the act.[107]

Meanwhile little progress had been made in driving the various kinds of adulterated butter from the market. Most objectionable of these was "new process," "renovated," or "reconstructed" butter. This was cheap, rancid butter that had been subjected to partial purification by re-working it with buttermilk, after which it was colored, flavored, and put on the market as "pure creamery butter." In 1898 the editor of *National Stockman and Farmer* said, "There is nothing in sight to materially interfere with the manufacture and sale of this ['process'] butter."[108] The rapid rise of market milk as the main outlet for the product of the Pennsylvania dairy cow, instead of butter, did not lessen the insistence of dairymen that this fraudulent practice be outlawed.

MARKET MILK

Fluid milk began to compete with butter as the major product of Pennsylvania dairies about 1870, but was not preponderant until after 1900. The rise of market milk was coincident with the growth of cities. When it was no longer possible for town dwellers to keep cows, as had been their custom from colonial days, they required market milk. This commodity was largely responsible for bringing to an end the practice of summer dairying, in which cows were dry during the winter months, since the demand for fluid milk is continuous throughout the year. The advent of the silo helped to make year-around dairying possible. The relatively higher price for winter milk, sometimes amounting to a differential of thirty per cent in the early days, also was an incentive to year-around dairying. The development of an outlet for market milk was contingent, also, on improvements in transportation facilities and refrigeration.

The market milk industry first developed within fifty miles of Philadelphia, about 1830. In 1870 Chester County shipped 1,598,000 gallons to Philadelphia; and Bucks County, 1,030,000 gallons. Lancaster County, which then was handicapped by inadequate transportation facilities, shipped only 143,000 gallons. Between 1870 and 1890 there was a tremendous increase. In 1890 Chester County shipped 20,000,000 gallons, Bucks County 11,000,000 gallons, and Lancaster County 8,000,000 gallons. Montgomery County also was a large producer.

In the early days dairymen living within driving distance of the city retailed their milk to consumers in horse-drawn vehicles. By 1870 most of it was handled by wholesale or retail middlemen. Little attention was paid to sanitation. "Much of the milk exposed for sale [in Philadelphia]," said *Farmers' Cabinet* in 1844, "has, on standing a few hours, a *dark sediment*. . . . It is from the udder and belly of the cow—in the process of milking, it has . . . fallen into the pail." A large proportion of market milk was watered. In 1865 the Philadelphia *Press* reported, under the heading "City Milkmen on the Rampage": "Pumps, it had been believed, were as necessary to the

Skimming station, 1890

business of milkmen as well filled udders. . . . Before day half a company of milkmen, in painted wagons, are dragged to the platform [of the North Philadelphia Railroad depot] by sleepy, asthmetic horses, who are doomed to drag away an additional load of four or five half-filled milk-cans to the nearest pumps or hydrants (perhaps) where the cans become still heavier by being filled entirely or a third more (perhaps). . . ."[110]

The practice of watering milk continued to be quite general until after 1890. In 1881 the microscopist of the State Board of Agriculture examined the milk supply of Philadelphia and reported, "The great bulk of the milk supplied at retail in Philadelphia has either had a considerable portion of its cream removed by skimming, or about one-sixth volume of water has been added."[111]

The marketing of fluid milk is subject to more fluctuation and disagreement than that of any other farm commodity. Producers and distributors have been arrayed against each other much of the time in seemingly irreconcilable conflict of interest. From the beginning of the industry attempts have been made to bring some degree of order out of the chaos by means of cooperation among producers. In 1862 the Philadelphia *Inquirer* reported, "An agreement has been made by the dairy farmers of Bucks and Montgomery counties in reference to establishing a uniform selling price of milk."[112] This venture was short-lived. In 1872 the Dairymen's Association of Philadelphia was organized for collective bargaining with dealers.[113] This, likewise, soon perished in the heat of conflicting personal interests. Again, in 1877, it was stated, "The dairymen of Montgomery and Bucks counties have agreed upon a uniform rate for milk and appointed a general agent, who . . . will dispense the milk to dealers in this city."[114] This was the "Dairymen's Protective Association," consisting of farmers who shipped milk over the Philadelphia and Reading Railroad. The agent sold the milk of each shipper separately; it was not pooled. He received from the shipper $1.00 for selling eighty or more quarts a day.[115] In 1898 producers in New York, New Jersey, Pennsylvania, Connecticut, and Massachusetts who shipped to New York City organized the "Five States Producers' Association" to combat the Consolidated Milk Exchange, a dealers' trust which fixed prices. This producers' organization was disbanded in 1907.

Returns to dairymen for market milk varied greatly from year to year. In 1871 the Doylestown Farmers' Club discussed the topic: "Which is more profitable to the farmer, milk or butter?" The verdict was practically unanimous in favor of milk. Not so reassuring was the experience of certain Chester County dairymen; in 1877 one of them said, "We ship hundreds of thousands of quarts of milk per day to Philadelphia which we sell to middlemen. We deliver it to them in the city and receive three to three and a half cents a quart. This is, in most cases, below the cost of production after taking out the freight bill which in my case is twenty-five per cent. The milk dealer, however, sells it in a few hours at a profit of from 175 to 300 per cent, thereby getting the lion's share. Is there no remedy for this state of things?"[116] Dairymen sought the answer to this question in vain. The Philadelphia Milk Exchange, a dealers' organization established to reach agreement on uniform prices to be paid to producers, came into being about 1890.

Despite "below-the-cost-of-production" protests by producers, market milk must have been more profitable than butter near Philadelphia. In 1880 Gilbert Cope of Chester County reported, "Along the lines of our railroads dairy farming is the prominent interest. A daily supply of many thousand quarts of milk is shipped . . . in large tin cans, which are sent back empty by the city dealer. Dr. Morris, of Birmingham, has commenced the shipment of milk in sealed glass jars, by which plan it reaches the consumer in better condition, and without adulteration."[117]

The practice of selling milk in glass bottles was originated by a distributor in Brooklyn, New York, in 1878. The new container was received with such enthusiasm by consumers that all his competitors were forced to adopt it and its use quickly spread to other markets. The bottle effected a marked improvement in the quality of milk. Previously milk commonly was shipped in five-gallon or ten-gallon cans. Dealers met the milk train in early morning and at once began to deliver the milk to consumers. It was dipped from the cans, or drawn from a spigot, into receptacles provided by consumers. It had no protection from dust except the wagon top; milk seldom remained sweet more than twenty-four hours unless a preservative was added.

In small towns milk usually was retailed by producers, each of whom ran a milk route. Until about 1890 neither producer nor distributor made any distinction as to grades; milk was milk and all of it sold at the same price. Certified milk having a very low bacterial count was first produced for feeding infants in 1892, under the direction of a medical commission. Pasteurized milk and cream became available about 1896. As transportation facilities improved and cities grew, they reached farther and farther into the country for their milk supply, from about fifty miles in 1870 to several hundred miles in 1900. Most of the product of the 1,000,000 cows on Pennsylvania farms in 1900 was shipped to Philadelphia, New York, Pittsburgh, Baltimore, and smaller centers of population as market milk.

WHISKEY MASH MILK

A most revolting and criminally unsanitary method of producing milk was practiced near large cities, including Philadelphia, between

1840 and 1870. This was the feeding of whiskey mash, a by-product of distilleries, to permanently stabled cows. The animals were fed the wet, warm mash from which the starch had been taken to make alcohol, the year around. In 1847, *Farmers' Cabinet* of Philadelphia quoted a "*New York Paper*": "There exist on Long Island, near Brooklyn, several *manufactories* of milk. . . . One of these *dairies* covers a space of 600 feet front by 300 feet deep, carefully fenced in, so as to be as private as possible—the business of the people being to *drink* the milk, not to know how it is *made*—in which enclosure 400 cows are kept the whole year round. These cows are fed on the refuse slop of the whiskey distilleries, and it is given to them *warm* . . . adulterated with water and cheap feed. . . . After having fed upon it for a week or more, their appetites become so depraved that they will take no other food. The result is their milk-producing organs are stimulated to a wonderful degree; they yield enormously, but soon become diseased; their gums ulcerate, their teeth drop out, and their breath becomes fetid . . . [they] puff up and bloat; their joints become stiff, so that they cannot lie down. . . . Bad as this is, the milk is afterward mixed with molasses, water and whiting, and then sold to the people of New York for pure milk! . . . It is of course very injurious to children. . . . Some idea may be formed of the profit made by computing one barrel of slop to a cow, costing sixpence, and the milk produced being eighty cents!"[118]

In his book, *The Milk Trade of New York and Vicinity,* published in 1853, John Mullady states, "From 8,000 to 9,000 children die annually in New York City from diseases caused by the use of impure milk, mainly from cows fed distillery waste, swill and other slops. There are some very large stables each containing 600-700 cows . . . The unfortunate animals are so placed as to be almost constantly over the swill trough. . . . The cows are occasionally fed hay and grain but the latter always is mixed with slops in their trough. . . . The appearance of the animal after a few weeks of feeding upon this stuff is most disgusting. The mouth and nostrils are all besmeared and the eyes assume the leaden expression indicative of that stupidity which generally is the consequence of intemperance. . . . Each cow drinks about twenty-five or thirty gallons of this swill a day.

"The milker has to raise the cow from the filth in which she has been lying and with which she is covered. . . . The hands of the milkers seldom or never are washed before milking and if they were they would soon be soiled by the cow's udder. It occasionally happens that a lump of filth falls into the milk; then the hand of the milker follows it and brings it out. . . . When a cow becomes diseased it is milked up to within one or two days of its death, even though two men may be required to hold her upright. . . . The cattle seldom or never are allowed to leave the stable; they are constantly breathing the fetid air of their prison. Their teeth rot out, their hoofs grow to an unnatural length and turn up and may be so sore that the animals are quite lame and are unable to stand. . . . It is a melancholy sight to see some of the poor creatures, when they are so fortunate as to get out of their pens for an hour or two, attempting to walk."[119]

That the horrible conditions described as existing near New York City also were present to some extent near Philadelphia is evidenced by a statement by James Gowen of that city in 1845: "Much of the milk served to the city is produced from such feed as is procured at the distilleries and breweries. . . . Cattle thus fed, become diseased, their secretions are impure. . . . The citizens . . . may be found administering to their children daily, a vitiated fluid, strongly impregnated with deleterious matters . . . the inhumanity in the treatment of cattle, and the quality of some of the milk . . . present strong claims to the justice and intelligence of our Society."[120]

The quantity of the milk from this source sold in Philadelphia was but a fraction of the total supply, nevertheless it is evidence of the callousness of both human and bovine misery that prevailed at that time. Strangely enough, relief came more from concern over the treatment of the animals than of the babies. In 1866 the Society for the Prevention of Cruelty to Animals was organized. It crusaded against keeping cattle under such unsanitary conditions and for humane methods of transporting and killing them. By 1875 the flow of poison milk from whiskey-mash dairies had ceased.

Adulteration of milk, however, continued until after 1900. This was done more by distributors than by producers, although some farmers "married the cow to the pump." Said one disgusted dairyman in 1878, "The infernal greed of the milk vendor rules supreme over every principle of humanity. A tumult will yet be raised over the adulteration of milk." In 1880 there was a law on milk adulteration which applied only to the counties of Erie, Crawford, and Mercer, then the center of the cheese-making industry.[121] Inspection of the urban milk supply at public expense was advocated in 1888 but was put into effect only in Philadelphia. There a lactometer was used; this determined total solids and purported to show whether water had been added, but was rather unreliable. In 1892 the Philadelphia Board of Health endeavored, but without success, to have the General Assembly enact a bill establishing standards for milk sold in that city.[122]

The act of Congress of June 26, 1895, commonly known as the "Pure Food Act," marked the beginning of active organized warfare against the adulteration of foods. In that year the General Assembly, also, passed a pure food law. In 1896 it was stated, "Pennsylvania has no general milk law. It, however, has one applying to cities of the second and third class, fixing a standard of total solids at 12½ per cent., three per cent. fat and a specific gravity [of 1.029 to 1.033]. Cities, as a rule, have their local inspectors . . . who exercise a supervision over the quality of their milk supply.[123].

In 1896 Pennsylvania Department of Agriculture made a study of the milk supply of Pennsylvania cities and found "adulteration, within the meaning of the pure food law: 1. By the addition of water, a method of adulteration which was found to exist at all stages, and more or less at every change of ownership. 2. The removal of the cream by skimming. 3. The addition of skim-milk."[124] Finely powdered chalk or flour were added to watered milk to raise the specific gravity to the required standard. Milk dealers sometimes added "milk preservatives," usually formaldehyde or boric acid, to prevent rapid souring. There was no law against this practice until after 1900.

Coincident with the development of the factory system of making butter and cheese, condensed and evaporated milk became an important outlet, especially for farmers in districts remote from city markets and where the cost of production was relatively low. The first patent on condensed milk was issued in 1856; it made possible the concentration and storage of milk. The Civil War gave impetus to the new industry; by 1870 the product was well established on the market. Ice cream was first made in quantity about 1850; by 1900 it was utilizing a considerable quantity of milk. The great development of the commercial ice cream industry, however, did not occur until after 1900; previously it had been merely a side line. Part of the reason for the slowness with which the American people adopted ice cream as the national refreshment was said to be the fact that so much of it was made with oleo and artificial flavors.

DAIRY ECONOMICS, 1840-1900

By 1900 dairying was firmly established as the most important farm enterprise of the State. The major product was no longer butter or cheese but market milk. The rapid growth of the industry after 1870 is one of the most outstanding features of the agricultural history of the Commonwealth. In 1896 the Dairy and Food Commissioners reported, "There are kept in the State 1,000,000 cows, producing about 1,700,000,000 quarts of milk annually. Of this product, about 960,000,000 quarts are used for butter, producing 80,000,000 pounds annually. A portion of the balance is used in making cheese, of which 6,000,000 pounds are produced. The remainder of the milk, with the exception of several car loads daily from the northeast section of the State that finds a market in New York city, is consumed as milk or cream by our citizens."[125] In 1900 Pennsylvania ranked second among the states in the value of dairy products, third in market milk, third in the production of butter, and fourth in the production of cheese.

By 1900 dairying was the leading farm enterprise in every county of the State, but was most highly developed in the southeastern and northern counties. In 1840 Lancaster and Chester counties were about equal in the total value of their agricultural products, but Lancaster excelled in crop husbandry and Chester in livestock farming. In 1840 Chester, Bucks, Montgomery, and Delaware counties led in dairying. Of these, all but Delaware were in the forefront of dairy production in 1900, together with Bradford, Lancaster, and Berks counties.

In spite of occasional periods of ruinous prices, dairying must have been reasonably profitable over a term of years, after 1870; otherwise it would not have become the leading farm enterprise. From 1840 to 1860 little profit was derived from the dairy. The report of the Committee on Dairying of the State Agricultural Society in 1852 computed the average price of milk cows at $15; the average production was seventy-five pounds of butter a year, "which, at an average price of twelve and a half cents per pound," was worth $8.38.[126] The common practice of milking cows only during the pasture season contributed largely to this low annual production and income. In 1855 the editor of *Pennsylvania Farm Journal* commented, "Through a large portion of Pennsylvania, our dairymen *continue* to keep cows, who, for one-half of the year, or nearly so, are all expense without any profit . . . a large majority of our dairy cows have not the *constitutional capacity* for deep milking."[127] Somewhat more favorable was the report of a Paoli, Chester County, farmer in 1856, who said that he shipped milk by railroad to the city of Philadelphia to a man who paid him three cents a quart for the summer six months and four cents for the winter six months. The freight amounted to a trifle over one-fourth cent a quart.[128]

During the period of fictitious prosperity that followed the Civil War, from 1865 to 1878, the dairy industry experienced flush times. Town people with a few thousand dollars eagerly sought to purchase dairy farms. The average price of cheese rose from seven cents a pound in 1861 to twenty-five cents in 1865. Some patrons of cheese factories, especially in the northwestern counties, took leave of their common sense and greatly overextended their credit. The financial panic of 1873 did not, for a few years, materially depreciate the price of dairy products. The crash came in 1879; it bankrupted many farmers, especially in counties that had gone cheese crazy.

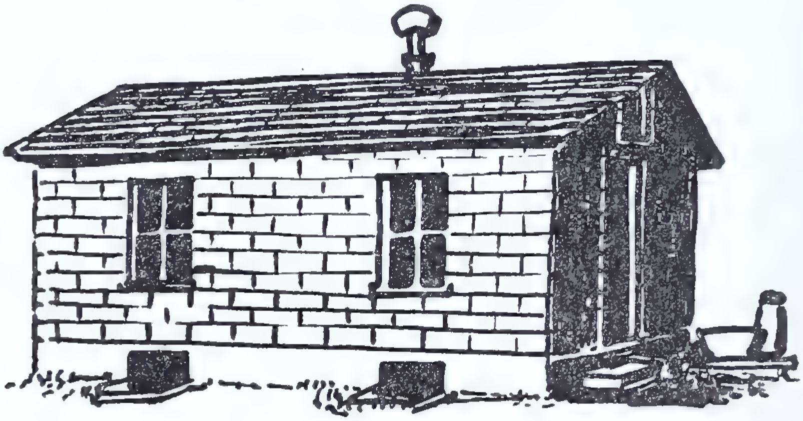
Meanwhile the butter dairymen of southeastern Pennsylvania, who had not been affected by the post-war inflation as much as cheese dairymen, continued to have moderate returns. In 1871 William Paxton of White Rock, Lancaster County, reported the income from his dairy herd of twelve cows: "Average yearly [butter] product of each cow [for the period 1864 to 1871], 155 2/3 pounds. . . . Average yearly amount realized from each cow, $76.23."[129] These were gross receipts, the net profit, even after taking into account the value of the calf, the skimmed milk, and the manure, was less.

In 1874 a Bucks County dairyman discussed the economics of dairying in his county: "Assuming the average cow to make 150 pounds of butter [a year]. . . . The average wholesale price for butter last year [1873] was thirty-five cents per pound in the Philadelphia market, which makes $52.25 . . . which amounts to $12 profit, to which add $12 for the calf, making an average of $24 a year per cow."[130]

In 1884 Eastburn Reeder, one of the most progressive butter dairymen in Bucks County, gave this financial statement of his dairy of fourteen cows:[120]

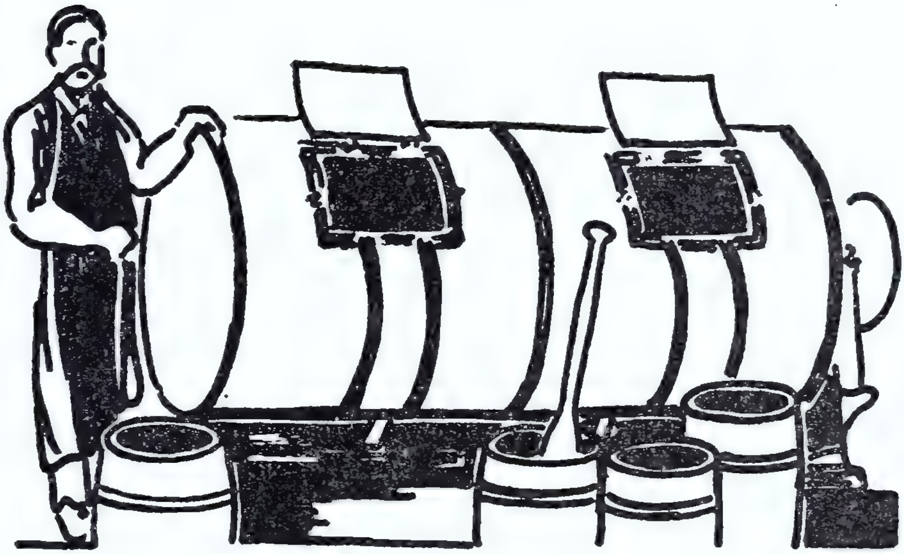
"Average annual receipts per cow		$128.03
Cost of keeping:		
Hay and dry fodder	$20.00	
Pasture	13.00	
Grain	50.05	
Labor	10.00	93.05
Annual profit per cow		$34.98"

These were better than average returns. So depressed was the market that in 1886 Edward Brinton of Chester County said, "The markets for all dairy products have been depressed, dull, and unsatisfactory for several years, and the question seriously debated in the minds of many farmers is, 'Does dairy farming of any kind pay?' "[131] Not until after 1900, when market milk had largely superseded butter as the main product of Pennsylvania dairies, was there any appreciable improvement in the economics of the industry.



An early type of milk house

IX



Modern creamery churn

DAIRYING, 1900-1940

AFTER 1900 the natural advantages of Pennsylvania for dairying, particularly favorable conditions for the production of corn, hay, pasture grass, and alfalfa, together with economic advantages, especially proximity to excellent markets, made this industry the most important farm enterprise of the State. By 1940 approximately forty per cent of the cash income of Pennsylvania farmers was derived from the dairy. Soon after 1900 market milk, instead of butter, became the major dairy product. Under present methods of producing milk, the hay, grass, grain (except wheat), silage, and other forage and feed grown on the farm are marketed mainly through the dairy cow. In 1940 Pennsylvania was eighth among the states in the production of milk and tenth in number of cows.

HERD IMPROVEMENT

After the monthly or weekly milk check had become the major source of income of Pennsylvania farmers, the percentage of purebred animals increased rapidly. Nevertheless, relatively few entire herds were purebred; most of the animals were grades which were bred to purebred sires. Dual-purpose breeds, mainly Milking Shorthorns and

Red Polls, still found favor with some farmers, but the more highly specialized milking breeds were in the great majority. In 1920, according to the Pennsylvania Department of Agriculture, the estimated proportion, in the total number of cattle, of each breed of milk cows, including grades and scrubs, was: Holstein, 43.8 per cent; Jersey, 15.3 per cent; Shorthorn, 11.5 per cent; Guernsey, 10.5 per cent; Ayrshire, 1.4 per cent; other breeds, 1 per cent.[1]

The pre-eminence of the Holstein is understandable in a State in which dairying is primarily for the production of market milk. This breed is noted for the large volume of its milk production, although the butterfat content is relatively low, averaging 3.4 per cent as compared with 4.9 for Guernsey and 5.3 for Jersey. Since the amount of the farmer's milk check is determined not only by the volume of milk marketed but also by its percentage of butterfat, the relative value of the different breeds is not wholly a matter of volume. To the burning indignation of farmers who marketed Jersey milk in Pittsburgh in 1914, the city milk testers fined them "because their milk had less than three per cent butterfat." Investigation disclosed that it had been watered by dishonest dealers. In recent years the Guernsey has increased greatly in popularity, especially among producer-distributors, because it produces a satisfactory volume of milk of high butterfat content and a rich, golden color which is attractive to consumers. The interests of each of the several breeds are advanced by state, district, and county breed associations.

The improvement of dairy herds has been promoted from time to time by the cooperation of town and city business groups. The business men of Grove City, Mercer County, were among the first to show an interest in the progress of farmers in their trading area. In 1916 the Grove City Commercial Club brought into the county a carload of purebred, high-producing cows and sold them to farmers on easy terms. Fourteen more carloads followed. The business men of other communities have made similar contributions.

The average annual production of milk by a cow has increased about one-third since 1900. This has resulted from better breeding as well as better feeding. By 1910 the practice of having most cows freshen in the spring, milk heavily during the summer, and then winter-over dry on hay and corn stover had largely ceased. Thereafter cows were fed and bred for milk production throughout the year. In 1900 the average milk production by a cow was 3,500 pounds; by 1940, it was 5,140 pounds, or 195 pounds of butterfat. Average production, however, does not represent results secured by the large number of better-than-average farmers. In 1940 the Agricultural Experiment Station reported, "Milk production on 348 representative farms varied from 3,047 to 12,651 pounds per cow." In the best herds only cows yielding at least 300 pounds of butterfat and returning a profit of at least $100 a year above feed costs were considered worthy of keeping.

Upgrading dairy cattle by the organization of community Bull Associations began in 1915. Neighboring farmers cooperated in purchasing an outstanding purebred bull which became the sire of herds of members. By 1941 there were ninety-nine such associations, owning 400 bulls. These were the main source of proven sires. In 1924 a scrub bull was brought before a "Court of Bovine Justice" at a mock trial held by 1,500 farmers of Franklin and adjacent counties. Witnesses for the Commonwealth asserted that the defendant was the unworthy sire of progeny which like himself, were a liability to their owners. Counsel for the defense argued that the defendant contributed to economy in labor since little time was required to milk his daughters. The verdict—"The defendant to be shot at sunrise"—was duly executed.

Dairymen have derived much benefit from "progeny testing" or the use of proven sires—bulls that have proved to be capable of transmitting the character of high production to their offspring. The milk and butterfat production of the daughters of a given sire is compared with the production of the dams of his daughters. Emphasis is placed on developing lines within the breed capable of transmitting to their offspring the ability to excel.

"Artificial breeding," or the artificial insemination of sperm from a very superior sire on a much larger number of cows than would be possible in natural mating, was developed in Denmark as a means of herd improvement. The method was practiced experimentally in Pennsylvania before 1940 but the first artifical breeding cooperative was organized in 1942. The resulting "test tube calves" were so superior that the method quickly began to find favor. It reduces the number of males required, provides superior sires, and promotes economy.

The Cow Testing Association or Dairy Herd Improvement Association has been a potent factor in the improvement of herds by eliminating low-producing animals through cooperative use of the Babcock test and milk scales. A trained and licensed tester is employed by a group of cooperating dairymen. The first Cow Testing Association in the United States was organized in Newaygo County, Michigan, in 1905.[2] The first associations in Pennsylvania were those in State College, organized in 1909, and in Chester County in 1910.[3] The Chester County (Brandywine) Association had twenty-one members with 784 cows. The average yield that year was 5,724 pounds of milk or 234½ pounds of butterfat.[4]

After 1914 Cow Testing Associations increased rapidly. By 1917 there were twenty-six. It was reported that year, "Of 600 cows in a

Bradford County Association, 25 per cent of the cows were found to be unprofitable. In the same association a grade cow purchased for $75 showed a profit of $120.65 above her feed cost . . . a profit over 2½ times greater than an entire herd of sixteen cows in the same association."[5] In 1935 the associations began to compile life-time production records as well as annual records.

Typical of results secured by community D. H. I. Associations are the records of a group at Grove City, Mercer County:[6]

	Average pounds of milk	*Average pounds of butterfat*
1918	5,093	225.0
1928	6,430	323.1
1940	8,001	383.1

In 1929 the Cow Testing Associations of Pennsylvania "increased the value of the product per cow $6.93 over the preceding year. . . . Tests located 2,479 unprofitable cows in the herds of members, who promptly sent the 'boarders' to the butcher."[7] The herd having the highest record in 1937, with twenty-five cows, averaged 16,664 pounds of milk and 601 pounds of butterfat.[8]

By 1939 there were 102 Cow Testing Associations with 55,262 cows in 1,553 herds. In ninety-seven of the associations the cows produced over 300 pounds of butterfat; five averaged more than 10,000 pounds of milk to a cow, or about twice the average production for the State. Over 10,000 cows were removed from these herds during the year because of low production.

The direct relation between average yield by a cow and profit is evident from this statement by an agricultural economist: "Cost of milk studies over a long period of years show that when milk testing 3.8 per cent butterfat is not selling for more than $2.75 per hundred pounds, cows that produce less than 7,000 pounds of milk are not profitable."[9] In Cow Testing Associations "Old Brindle," the cow that the owner thought was the most valuable animal in the herd, has to meet an exacting test which may prove her to be quite the opposite.

Beginning in 1925, the Pennsylvania Dairymen's Association has given recognition to those members of Cow Testing Associations whose herds have averaged 3,000 pounds or more of butterfat. In 1939 there were 438 dairymen who qualified for this honor and 136 whose herds averaged 4,000 pounds or more.[10] Thus does the standard of performance constantly move forward.

"Advanced Registry," under which purebred animals are under official test, has stimulated competition for high production records. In 1948 it was announced that Penstate Veeman Josie, 1611012, a Holstein cow owned by The Pennsylvania State College and born on January 7, 1933, was "the highest living milk producer in America." She averaged 55.6 pounds of milk (25.8 quarts) daily during the 4,000 days of the test.[11]

DISEASE CONTROL

The State-wide campaign to eradicate bovine tuberculosis, begun in 1895, was brought to a triumphant conclusion in 1936, but only in the face of bitter opposition of a considerable number of farmers and a few veterinarians. The situation in 1902 was reported by the State Veterinarian: "[Tuberculosis] is still the most widespread and dangerous disease among cattle in Pennsylvania. It is estimated that the losses from this disease amount to from $2,000,000 to $3,000,000 a year. . . . In one herd this year, the losses from tuberculosis amounted to $5,000. . . . The disease is believed to be practically eradicated from . . . the parts [of the State] where the herd owners themselves have taken the most active interest in repressing the scourge."[12] Between 1903 and 1910 the State Veterinarian experimented with vaccination against tuberculosis, but without success.

The percentage of reactors to the tuberculin test gradually decreased. According to *National Stockman and Farmer,* "In 1896 the test was applied to 432 suspected herds containing 5,430 cattle. . . . The percentage of animals reacting to the test was 21.9. . . . Last year [1911] 1,109 suspected herds containing 13,403 cattle were tested . . . the percentage of reacting animals in 1911 was only 9.95. . . . When we consider the fact that . . . most of the reactors are not in a condition dangerous to public health, we realize that Bovine tuberculosis has ceased to be a serious menace . . . in this state."[13] Later evidence showed that this optimism was unjustified. In 1915 the State Veterinarian summarized twenty years of the test:[14]

Number of herds tested	14,363
Number of cattle tested	192,310
Number of cattle reacted	24,408
Number of herds free of tuberculosis	7,174

Opposition to the tuberculin test from some farmers was present from the beginning; it flared high between 1912 and 1928. They argued that the test did not reveal all the infected animals, that some reactors were not diseased, and that it did not detect enough diseased animals to make it practicable. They objected to the testing of their herds by State authorities as an unwarranted intrusion on private business. The dissenters organized the "Pennsylvania Cattlemen's Association," which attacked the State livestock sanitary laws in the legislature and in the courts. The shortcomings of the tuberculin test, as then administered, were admitted by its supporters, who contended, however, that it was the most reliable means then known of diagnosing the disease.

On October 1, 1918, Congress made the first federal appropriation for the control of bovine tuberculosis, to be used to supplement funds provided by the state for testing and the payment of indemnity. In 1919 the Pennsylvania Plan, as developed by Leonard Pearson, was merged into the Federal-State Accredited Herd Plan. The most important forward step in tuberculosis control was in 1923, when the aroused dairy interests of the State besieged the General Assembly for a State appropriation large enough to permit more rapid testing. At that time only fifteen per cent of the cows of the State had been tested. The Legislature granted an appropriation of $2,000,000 for the bienuium. In 1925 this was increased to $3,000,000, which sum also was made available during the next two bienniums.

These increased funds made it possible to put into effect area testing, in which all cattle in an area comprising one or more townships or an entire county were tested at one time. The initial test was followed by re-testing until the area was practically free from the disease. The first county to come under the area-testing program was Mercer, soon followed by Jefferson and Crawford. By the close of 1925, six counties and 191 townships, including 219,210 cattle, had been tested under the area plan. Mercer was the first county to be declared tuberculosis-free, in 1923. Gradually other parts of the State came under the program, the southeastern counties, where infection was heaviest, last of all.

By January 1, 1927, all herds in 531 townships of forty-five counties had been tested. In seven of these counties the incidence of the disease had been reduced to less than half of one per cent; these were designated "modified accredited areas." The number of accredited herds in 1926 was 8,152, comprising 119,051 cattle. The percentage of reactors that year was 5.5 as compared with 10.3 in 1916, 13.8 in 1906, and 21.9 in 1896. So encouraging were these results that the State Veterinarian was moved to prophesy, "The eradicaton of bovine tuberculosis throughout the State is in sight."[15]

Meanwhile additional pressure on dairymen to remove tuberculous animals from their herds was exerted by municipalities. Philadelphia, New York, and other cities began to demand their milk supply come only from herds of tuberculin-tested and disease-free cattle, and to enact ordinances to that effect. Enforcement of these ordinances was fought strenuously by some dairymen, especially in the southeastern counties. Prosecutions followed. The most bitter opposition came from farmers who marketed milk in the city of Lancaster, which passed such an ordinance in August, 1926.

A "Farmer's Protective Association" was organized in 1926 with membership in Lancaster and adjacent counties. It was pledged to combat compulsory tuberculin testing of cattle and the requirements of municipalities in this respect. These dairymen resented what was virtually compulsory testing. To them, this was an invasion of their rights as citizens, an unwarranted search or even seizure of their property against which, they said, they were protected by the Constitution. Supporters of the policy pointed out that farmers did not have to sell their milk to cities that required testing of cattle, and that area testing by the State was done only when ninety per cent of the herd owners voluntarily signed an agreement placing their herds under the State program. By that time area testing had largely superseded the Individual Accredited Herd Test of earlier years.

In May, 1927, the Supreme Court of Pennsylvania upheld the Lancaster City Milk Ordinance. This decision established the right of municipalities to set the standard of milk sold within their boundaries. The dissenters were a small minority; at that time more than 60,000 Pennsylvania dairymen had given their approval to the policy involved by voluntarily having their herds tested. In any case, the public interest had to take precedence over the personal point of view of a minority. In 1929 it was reported, "Since Lancaster adopted an ordinance requiring that all milk sold in the city be from tuberculin-tested cattle, there has been a noticeable decrease in the deaths of children under two years of age, due to tuberculosis. In 1926, 6.3 per cent of the total deaths were due to tuberculosis, . . . in 1928, only 2.2 per cent. Likewise, deaths of children under two years of age which could be attributed to intestinal and dietary conditions decreased from 27 per cent in 1927 to 24 per cent in 1928."[16]

After 1929 the program proceeded with greatly accelerated momentum. By January 1, 1934, "all the cattle in 54 counties had been completely tested and all but four of these counties had been modified accredited. . . . More than $14,000,000 has been paid as indemnity for tuberculous cattle in Pennsylvania during the past 15 years. Of this amount, two-thirds has come from the State and one-third from the Federal Government."[17] Of the 80,878 herds tested, comprising 802,274 animals (about 93 per cent of the total number in the State), there were 22,527 reactors. Cattle owners, also, made a substantial contribution to the program through their losses from the slaughter of reacting animals not covered by indemnity. During the course of the campaign over 335,000 reactors were condemned and slaughtered.

The last herd to receive the initial tuberculin test was that of Christian S. King of Lancaster County on May 15, 1935. By June 1, 1935, all the cattle of Pennsylvania were under supervision by the State for the control of tuberculosis. In November, 1936, Lancaster County—the last of the sixty-seven counties—was declared a modified accredited area. On December 16, 1936, the entire State was placed on that basis by the United States Department of Agriculture. *Penn-*

sylvania Farmer jubilantly exclaimed, "Pennsylvania has achieved the long sought end of being declared an accredited area in bovine tuberculosis eradication. On the last retest of her 1,500,000 head of cattle less than one-half of one per cent reacted to the test. . . . The State Department of Agriculture . . . is arranging to commemorate the event by observing an Achievement Day . . . December 16th."[18] It was, indeed, an achievement well worthy of such recognition.

In recent years the fight against bovine contagious abortion, or Bang's disease, has been waged as vigorously as that against tuberculosis and with equal promise of ultimate success. Bang's disease has been known in Europe for many years but did not become serious in Pennsylvania until after 1900, as transportation of cattle across state lines became more common. In 1930 it was estimated that the loss to Pennsylvania dairymen from this disease was five to eight million dollars annually.[19]

The Pennsylvania Plan for the control of Bang's disease was put into operation by the Pennsylvania Department of Agriculture on December 1, 1921—the first in the United States. It consisted of applying blood tests to herds at frequent intervals on the voluntary application of their owners, blood-testing of all the animals before they were added to the herd, destruction of reactors, and sanitary measures. A certificate was issued to dairymen whose herds were free from the disease. On June 1, 1932, the Pennsylvania Department of Agriculture put into effect a regulation requiring cattle imported into the State either to come from certified herds or to be tested before being admitted. Between 1926 and 1931 the number of positive reactors was 17,453. By January 1, 1934, the number of herds tested totaled 7,549 in sixty-five counties.

The Bang's disease control program made rapid headway after July 1, 1934, when the federal government, through the Agriculture Adjustment Administration, made available $1,000,000 to supplement state funds for partially compensating owners of slaughtered reactors. The first special State appropriation was in 1937. In 1938 it was reported, "Since July 1st, 1934, when the federal government began paying indemnity for cattle reacting to Bang's disease, 781,253 head of cattle have been tested for the disease in Pennsylvania. . . . Of these 39,062 or five per cent have reacted and have been slaughtered. Total federal indemnities and state indemnities which became available in 1937 . . . amount to $1,300,000. The disease was found in 10,382 of the 55,088 herds tested."[20] By April 1, 1940, all the herds in seventeen counties had been tested on a voluntary basis. Fourteen of these counties qualified as modified accredited areas (those in which only one half of one per cent or less of the cattle tested and five per cent or less of all herds tested were infected). It is expected that, ultimately, all of Pennsylvania will be accredited.

That most dreaded of all animal ailments, the foot-and-mouth disease (apthous fever), has struck Pennsylvania twice since 1900. No control measure is known except extermination of diseased animals. The first outbreak was in the fall of 1908. It was traced to cattle coming into the State from the East Buffalo, New York, stock yards. The disease was first diagnosed at Danville, Montour County, and later was found on 100 farms at eight other points in the State. Animals slaughtered by the State and federal governments comprised 1,320 cattle, 977 swine, 52 sheep, and 3 goats. Three months were required to stamp out the disease, during which period the State was under absolute quarantine—no livestock could be shipped in or out. The federal government paid two thirds of the appraised value of the animals destroyed, the State one third.[21]

The second outbreak was in 1914 and 1915. The disease was discovered first in the Union Stock Yards at Pittsburgh and later in 858 herds in thirty-four counties.[22] The slaughter of 15,131 cattle and 11,035 swine was required to suppress this outbreak. The entire State was under quarantine for several months; farmers suffered heavy loss since all traffic in livestock was suspended. The sum of $787,000 was paid in indemnity; this was derived about equally from federal funds and from a special State appropriation. The full appraised value of the animals slaughtered was paid to farmers. The total cost of suppressing this outbreak was $2,500,000. The *National Stockman and Farmer* called it the worst calamity that had ever occurred to our livestock industry.

Another highly mortal disease of cattle, chronic mastitis, has begun to cause concern. During 1935 a total of 3,167 cattle were condemned and slaughtered. The federal government compensated the owners of these cattle approximately $110,000.[23]

FEEDS AND FEEDING

Feeding practice has changed materially since 1900. The most important developments have been the practically universal use of the silo, a marked increase in the amount of proprietary concentrates purchased, and recognition of the role of vitamins in animal nutrition.

In 1909 the Pennsylvania Department of Agriculture reported that, largely as a result of the teaching of Farmers' Institutes, there were more than ten thousand silos in Pennsylvania. Three years later *National Stockman and Farmer* commented, "A great corporation which deals with farmers and has to extend credit to thousands of them every year has one rather interesting rule by which to rate a man: A farmer who has a silo is considered a good risk. . . . The presence of a silo . . . is evidence that he has most of the qualities that form a basis for credit."[24] In 1918 the number of silos had increased to 20,000, and by 1940 to 41,000.

No new development in livestock feeding was accepted by farmers more quickly than the use of grass and legume silage. Between 1937 and 1940 the number of farmers using it increased from twenty-five to 1,500. The paramount advantage is that the grass is cut early, when its feeding value is highest, and is stored with all its nutrients saved; whereas the loss of nutrients may be heavy in field cured hay.

Prior to 1900 most feed grains were home grown. Since then a steadily increasing proportion of concentrates—grains and mill feeds—have been purchased, whereas roughage—hay, fodder, straw, forage crops and pasture grass—continues to be mainly home grown. The greatly increased acreage of leguminous forage crops in recent years, especially alfalfa, red clover, and soy beans, is evidence of the search by Pennsylvania dairymen for means of reducing the feed bill. Legumes provide more protein and minerals than other forage crops except young pasture grass. In a few parts of the State, notably in the stretch of country between Lancaster and Morgantown, Lancaster County, land is so valuable for cropping that farmers have little or no pasture; their cows are turned out of the barn only for exercise. Under these conditions forage or soiling crops are grown and confinement feeding practiced. In general, however, the trend is toward a larger proportion of the farm being in semi-permanent or supplementary pasture.

The first legislative Act providing for the inspection of proprietary brands of stock feeds was passed in 1901.[25] This Act was declared unconstitutional by the courts, and a revised law went into effect August 1, 1909. It prohibited misbranding and adulteration of feeds and required a guaranteed analysis and the registration of each brand for each calendar year before it was offered for sale. So rapidly did farmers adopt the practice of purchasing feeds that by 1914 more than 2,300 brands were registered for sale. Thereafter the number declined, partly as a result of prosecutions. In 1937 there were 904 brands registered by 210 manufacturers. Of these, 485 were mixed poultry feeds and 317 were mixed dairy feeds.

Before the feed law went into effect and for a few years thereafter, fraudulent and low standard feeds were about as numerous as fraudulent and low standard fertilizers had been in earlier years, especially mixed goods. In 1919 the Pennsylvania Department of Agriculture reported, "Of this number [718 samples] of mixed feeds, there were 259 or 36 per cent. where variations from the compositions claimed were found.... These variations were not as a rule of a serious nature. . . . It became necessary during the year to order prosecutions in the case of 5½ per cent. of the samples received where serious violation of the law was found."[26] By 1940 the number of violations was less than two per cent and most of them were not significant. The College Feed Board, a group of college professors organized in 1927 at the request of manufacturers, counsels with them on materials and formulas.

The bill for concentrates is a very heavy charge against the dairy industry. In 1915 it was stated, "At least 600,000 tons of feeding stuffs are sold annually in the State, the greater portion of which is imported from other states; having a total valuation at a low average price of $25. per ton, [of] fifteen million dollars."[27] During World War I the high price of feed and acute lack of shipping facilities gave impetus to the movement to produce more nitrogenous feed on the farm, especially alfalfa, red clover, and soy beans.

"Feed pools" have helped to stabilize the price of concentrates. Under this plan farmers agree to buy concentrates through their cooperative three to six months ahead on a monthly quota basis and at a fixed price. This relieves them of price uncertainty and ensures a somewhat lower price since manufacturers are assured of a market several months ahead and can afford to sell on a closer margin. The ratio between the price of feeds and the price that the farmer receives for his milk fluctuates sharply; it is useful as an index in determining profit or loss in dairying.

Marked progress has been made in the science of animal nutrition since 1900. The publication, in 1909, of "Computation of Rations for Farm Animals by the Use of Energy Values," by Henry P. Armsby of The Pennsylvania State College, was an important contribution to feeding science and practice.[28] He derived his data from the use of the respiration calorimeter at the College. Farmers began to study ways of feeding "balanced rations."

The discovery of the role of vitamins in animal nutrition and in the prevention of disease caused by an inadequate diet brought about marked changes in feeding practice. Formerly it had been thought that proper amounts of protein, carbohydrates, fat, minerals, and water supplied all the food substances necessary to support animal well-being. In 1907 Stephen M. Babcock of the University of Wisconsin made an epochal experiment in which heifers fed yellow corn meal as part of the ration thrived much better than heifers fed other rations which were equivalent in food value as measured by chemical analysis. He concluded that yellow corn meal contained an unknown factor of nutrition which was lacking in the other feeds. This mysterious something was isolated by E. V. McCollum and others in 1913 and 1914. It was called vitamin A. Soon thereafter Harry Steenback showed that the ultraviolet rays of the sun generate vitamin D. Other vitamins, each having a specific function in nutrition, were discovered. The famous Holstein cow, Penstate Jessie, "the cow with a window in her stomach," was used in an experiment which showed that the cow can manufacture vitamin B in her rumen even when her food contains none of this substance.

The importance of vitamins in animal nutrition was first brought to the attention of Pennsylvania dairymen in an address by Dr. McCollum before the Breeders' and Dairymen's Association in 1919. This was the beginning of a new approach to the problem of animal feeding, especially of young stock. It was found that many calves were unthrifty because of lack of vitamins in the ration, particularly vitamin A. The discovery of vitamins served to emphasize the necessity of supplying livestock with an abundance of pasture grass, green forage crops, and properly cured hay. Green crops are rich in all the vitamins except vitamin D, which is derived through the action of sunshine. The vitamin requirements of cattle which run on good pasture in summer and are fed well-cured hay and silage, particularly grass silage, in winter are amply met.

QUALITY OF MILK

Hand milking, which often was a source of contamination of milk, began to give way to machine milking in the larger herds about 1920.

Milking machine

In 1902 L. W. Lighty of Adams County commented, "I know a few men who speak kindly of the milking machine but the great majority who tried it threw it on the rubbish pile and declared they can in much less time do the milking in the old way than keep the machine clean and in repair."[29] The machines on the market at that time were not efficient. According to a recent survey by the Pennsylvania Agricultural Experiment Station, the use of milking machines saved annually sixteen hours of man labor to a cow. Farmers with herds of over twenty cows had milking machines more frequently than farmers with small herds, indicating that a relatively large dairy enterprise is necessary to justify them.

After 1910, sanitary standards prescribed by State and municipal authorities made it necessary for most dairymen to erect a special room for the care of milk, separate from the barn or attached to it. Usually these are of concrete. Here the milk is separated and cooled. In 1936 there were 58,360 separators on the 191,284 farms of the State.[30]

The most important recent development in the care of milk is the method of cooling it. After 1930 the springhouse and milk cellar were displaced by the milk house and electric cooler. Well or spring water is not cool enough to prevent bacterial growth in milk unless it is approximately 50° F., which seldom occurs during late spring, summer, and early autumn. Ice can be used, but few farmers now cut ice. After 1930, when electric current had become quite generally available to farmers, electric coolers came into use. According to the Pennsylvania Agricultural Experiment Station, "Milk may be cooled with ice but electrically refrigerated cabinets are much more convenient. . . . Experiments have demonstrated the practical impossibility of cooling milk satisfactorily with well water. Present Pennsylvania regulations demand that milk shall be below 60° F. when delivered at dairy plants."[31]

The greatest advance in dairying since 1900 has been in sanitation, made possible by discoveries in bacteriology. The time has passed when the consumer was interested only in the cream line. Now he knows that quality in milk involves not only its food value but also its cleanliness, healthfulness, and keeping qualities. In 1900 few dairymen knew, or acted upon the knowledge, that typhoid fever, small pox, undulant fever, dysentery, and other diseases could be spread through milk. The need for sanitary precautions in producing milk has been one of the most difficult lessons for the dairyman to learn.

High quality in milk is promoted by cleanly animals and stables, sterilization of utensils, sanitary containers, the elimination of diseased animals, and high standards of personal cleanliness and health by those who produce, process, and distribute it. Quality in market milk is dependent on sanitary methods of distribution as well as of production.

A low bacterial count is one index of quality. Not much attention was paid to this factor in Pennsylvania until 1900, when D. H. Bergey of the University of Pennsylvania made a study of the subject for the Pennsylvania Department of Agriculture.[32] About 1903 the Pediatric Society of Philadelphia issued certificates to dairymen who complied with their requirements for producing "certified milk"—milk that was free from dirt and other impurities and adulterants, having a bacterial count of not over 10,000 per cubic centimeter, and produced and handled under sanitary conditions. Certified milk was used mainly for feeding infants.

Prior to 1920 very few dairymen produced milk of low bacterial count. Between 1920 and 1925 there was a marked change in this respect. In 1926 it was stated, "four years ago . . . there were times of the year when as much as forty per cent of all the milk produced in certain counties for shipment to the Philadelphia market was rejected at the country receiving station because it did not meet the consumers demand as to quality. This involved a tremendous loss to farmers. Today, in the same territory, seldom more than one per cent and never more than ten per cent is rejected."[33] On May 25, 1925, an Act of General Assembly became effective which required that all milk sold for drinking purposes in Pennsylvania must be served in the original bottle or other container in which the producer or processor had supplied it. This law protected consumers from diluted milk and from unsanitary methods of serving.

About 1905 pasteurization of milk began to come into favor. The milk was heated to 145° F. for thirty minutes or to 180° for at least one minute. This destroyed such harmful germs as those of tuberculosis, typhoid, undulant fever, dysentery, and diphtheria, and about ninety per cent of the harmless bacteria present. On July 1, 1914, the Philadelphia Board of Health ordered that all market milk and cream sold in that city be pasteurized except certified milk from herds approved by the Board as free from transmissible diseases. Other Pennsylvania cities soon followed the lead of Philadelphia.

Many dairymen and some physicians were opposed to pasteurization, believing that it made the milk less easily digested and that it would be used to cover up unsanitary methods of production. They said, "You cannot pasteurize dirt out of milk." To which a professor of dairying, H. E. Van Norman, added, "While there is no question that the clean, cold, raw, fresh milk is very much better than any milk Pasteurized under most conditions, it is nevertheless true that efficiently Pasteurized milk under some conditions, is the lesser of two evils. . . . In most cases it [pasteurization] is used as a shield for carelessness, uncleanliness, and even positive filthiness."[34] By 1925 the advocates of pasteurization had won the argument. Its general use was hastened by the adoption of city ordinances and by improvements in pasteurization methods.

Until after 1900 milk was not classified by grades—milk was milk. By 1910 the terms Grade A, Grade B, and Grade C were coming into use. These grades were based on such factors as percentage of butterfat, bacterial count, foreign matter present, and freshness; also on the use to which it was put, as market milk or condensed milk. A legislative

Act of 1911 specified that market milk must contain 3.25 per cent butterfat. In 1926 the standard was set at four per cent. The present standard is 3.25 per cent butterfat and at least 12 per cent total milk solids. Homogenized milk, in which the cream does not rise, began to find favor about 1910; being more easily digested than ordinary market milk, it is especially valued for infants and invalids.

Adulteration of milk was common until about 1930. Removal of cream or the addition of water were practiced even by some "good dairymen." A few supposedly reputable agricultural journals published such information on milk adulteration as, "A little salt or other ingredient may be added to watered milk to bring its density up to the pure milk mark"; or, "The blueness of milk produced by either skimming or watering may be removed by the use of burnt sugar, which will give it a rich color."

The most common adulterant was water. Of 293 samples of milk secured in the open market by the Pennsylvania Department of Agriculture in 1901, 237 were found to be pure, and fifty-six were found to be either watered or skimmed, and several contained a preservative.[35] Prior to 1909 such irregularities were handled under the general pure food law of the State. On March 24, 1909, the General Assembly passed a law providing penalties for the addition of water to milk and for the sale of skimmed milk except as such. This law was urgently needed; for there were many flagrant violations. In 1910 it was stated, "It has become so in the market that people have to buy anything [in the way of milk]. . . . There was a time here this fall when more skim milk was going into Philadelphia than whole milk."[36]

After the passage of the milk adulteration law, the Pennsylvania Department of Agriculture took vigorous steps to enforce it. Many prosecutions were made, principally of dealers. By 1916 only three of 2,893 samples of market milk analyzed contained a preservative—formaldehyde; 175 were below standard in fat or milk solids, of which forty-four had been skimmed and fifty-four watered.[37] A few prosecutions for selling watered milk were made each year until about 1930 and a few dishonest milk testers, weighers, and samplers were detected. The practice of preserving milk with formalin, which once prevailed in up to twenty per cent of city milk, disappeared after 1930. "Filled milk," in which part of the butterfat had been replaced by a cheaper fat, as cocoanut oil, once was used in large quantities under various trade names, especially evaporated milk. By 1920 this snide practice had been brought under control, and by 1930 adulteration of milk had practically ceased.

DAIRY INSPECTION

Fluid milk is such an important article of food, particularly for children, that it has been thought necessary to protect the public interest by state and municipal inspection of dairies and processing plants in order to ensure that sanitary methods of production and distribution are employed. Says Deane W. Malott, "Conforming to the [state and municipal] sanitary requirements imposes a financial burden on the milk producer, both for capital outlay and for operating expenses. The capital outlay is required both for farm and dairy buildings and for the herd. The dairy farm is rated by inspectors on such items as ventilation, light, screening, manure disposal, and general cleanliness of the dairy and the utensils. Meeting these requirements usually involves having a large barn with ample window space and concrete floors, and one which receives frequent applications of whitewash. The dairy herd is inspected regularly, and the operator must immediately dispose of any cow reacting unfavorably to the tuberculin test. There are also requirements as to cooling facilities and as to the promptness with which the milk is cooled to the required temperature."[38]

The first organized action looking toward inspection of dairies was by dairymen themselves. In 1906 the Pennsylvania Dairy Union resolved: "That the Pennsylvania Dairy Union advocate the passage of laws requiring efficient inspection of places where dairy products are made and handled."[39] At that time the laws of the Commonwealth already had committed to the larger municipalities adequate power to maintain agencies for the protection of their citizens against abuses in the milk trade. No State law providing specifically for dairy inspection was passed until 1929. Under the Acts of May 21, 1895, and March 30, 1905, the Livestock Sanitary Board of the Pennsylvania Department of Agriculture was authorized to cooperate with municipal Boards of Health, at the request of such boards, when an ordinance had been adopted requiring dairy inspection. In 1908 the Department began to inspect dairies which supplied Kittanning, Oil City, Homestead, and Warren.[40] In 1911 it began to inspect dairies which supplied Philadelphia. In 1912 the Department reported, "During the year the agents of this division made 23,728 routine inspections of dairy farms . . . 3,590 were scored 'bad,' indicating such unsanitary conditions as to preclude the possibility of producing clean, wholesome milk or dairy products."[41] The following year it reported, "The State Livestock Sanitary Board has made a statistical inspection of some 35,000 dairies by skilled men, and it was found that about 75 per cent. were conducted in a safe and sanitary manner, about 15 per cent. in a fair manner, while 10 per cent. were positively bad."[42]

Municipal and State inspection of dairies prior to 1925 effected little improvement, mainly because of lack of enforcement. If the city of Philadelphia had strictly enforced its health regulations in 1920, probably half of the milk coming into it would have been excluded. Not until after the dairymen themselves had taken the matter in hand was there appreciable progress. In December, 1923, the Inter-State Milk Producers' Association, which comprised dairymen of the Philadelphia milkshed, established a dairy sanitation code for its members. The standards set included healthy and clean cows, sanitary stables, handling milk so as to exclude dirt, caring for it in a building separate from the barn, and prompt cooling.[43] Each member was expected to secure a permit. This code went into effect in May, 1924; it gave a marked impetus to better dairy sanitation, not only in the Philadelphia milkshed but throughout the State.

In 1925 the Philadelphia Dairy Council, an organization representing both producers and dealers, began to employ field men to inspect cows, dairy barns, milk houses, and utensils in order to ensure that sanitary measures were practiced. The expense of inspection was met by equal contributions from producers and distributors. The Council had no regulatory powers conferred by statute; its work was on a wholly voluntary basis. This was an outstanding example of fruitful co-operations between two groups that often have been antagonistic.

In 1925 the Pennsylvania milk testing law went into effect. It gave producers greater protection by requiring that all milk testers, weighers, and samplers at country receiving stations be qualified and have a permit issued by the Pennsylvania Department of Agriculture; previously there had been much carelessness, considerable ignorance, and some dishonesty in the weighing and testing of milk at these stations. By 1930 many municipalities were requiring that all their milk be from tuberculosis-free herds and were beginning to take notice of the possible relationship between the incidence of undulant fever in humans and Bang's disease in cattle. On March 1, 1930, the Board of Health of Philadelphia required that all raw milk come from herds certified to be free from Bang's disease.

A State dairy inspection law became effective May 2, 1929. As amended in 1933, it provided that milk should not be received at a plant until a satisfactory report on sanitary conditions of the farm on which it was produced had been filed with the plant by the State. Prior to the passage of this legislation, only municipal inspection had been legal; but at that time only 147 of the 1100 municipalities had provided for this. The General Assembly of 1929 enacted a law which provided for the licensing and bonding of milk distributors. A Bureau of Milk Control was established in the State Department of Health; it was empowered to supervise the production and distribution of all milk sold for human consumption. All such milk must be pasteurized or come from cows certified as free from tuberculosis. Farms and dairies must be appraised by State inspectors as to sanitary conditions for milk production. All dairy farms must be provided with a milk house or milk room used exclusively for handling milk, and all utensils and containers must be sterilized. The State law did not supersede the various municipal regulations if these met minimum requirements.

Thus was established a dual system of dairy inspection, State and municipal. Sometimes the conflicting requirements of the two agencies were a source of embarrassment to dairymen. Many a subordinate Grange or other local group of farmers resolved: "*Whereas:* constantly changing requirements of local and state Boards of Health result in producers being forced to constantly change their equipment and practices," etc. Occasionally inspectors were appointees of a political machine and were not well qualified. The regulations seemed particularly harassing to Old Order Amish farmers of Lancaster County. Some of them solved the problem by organizing the Lancaster County Swiss Cheese Company as an outlet for their milk, unhampered by State restrictions. It was an immediate success. Gradually conflicting requirements were harmonized and farmers generally adapted themselves to the high standards of sanitation set. By 1940 dairy inspection was considered by most farmers as a necessary precaution in the public interest.

BUTTER VS. OLEO

The peak of butter production was reached in 1900 or a few years later, after which the output declined rapidly. Production of butter from churning on the farm fell from 79,336,000 pounds in 1880 to 10,500,000 pounds in 1940. The factors that contributed to this decline were the rise of factory manufacture, increased demand for market milk, and competition from the mid-western states. In 1940 York and Lancaster counties led in butter production on the farm.

Butter making gave way to market milk first, in both creameries and on farms, in the southeastern counties. In 1907 most of the milk produced in the northeastern counties still was made into creamery butter. By that time the era of fifteen-cent "June butter" had passed. The best creamery brands sold for thirty-five to fifty cents a pound. "Country roll butter" from farm dairies was passing out of the market all over the State; most farmers sent their milk or cream to creameries. The reputation of Pennsylvania creamery butter, however, was not high as compared with that produced in Illinois, Wisconsin, and Minnesota. Butter prices were set at Elgin, Illinois.

In 1907 The Pennsylvania State College began to hold Butter-Making Schools which were open to both creamerymen and farm butter makers, the announced purpose being "to improve the quality of Pennsylvania butter." Meetings of the Pennsylvania Dairy Union still were more concerned with problems of butter making than of market milk. By 1910, however, the demand for an increased supply of market milk had become so irresistable that butter-making creameries began to disappear. In some counties nearly all the creameries became milk-shipping stations.

In spite of the shift of market milk, more butter was churned on Pennsylvania farms in 1920 than in any other state except Texas—21,137,000 pounds. This remained about the only outlet for farmers living at a considerable distance from the railroad until hard surface roads and motor trucks were common. In 1890 more than fifty-five per cent of the milk produced in Pennsylvania was manufactured into butter and cheese; by 1934 only four per cent was sold as butterfat, as compared with thirty-four per cent for the United States.

The running fight between dairymen and manufacturers and distributors of oleomargarine which began in 1875 continued with unabated heat after 1900. The oleo interests constantly introduced legislation designed to favor the sale of their product, particularly to permit coloring it in imitation of butter, but the dairy interests were strong enough to defeat them. On May 29, 1901, the regulatory Act of 1885 was superseded by a new law which forbade the sale of colored oleo under any conditions and required that all oleo be plainly marked as such. Dealers were required to pay a license fee.

The Pennsylvania Department of Agriculture made a valiant effort to enforce this law. In 1901 it ordered 1,159 prosecutions for selling colored oleo and 21 prosecutions for selling "renovated butter."[44] Enforcement was handicapped by hostile public sentiment in cities, especially in Pittsburgh. In 1902 practically all the "butter" sold in Pittsburgh by the "Jersey Butter Company," the "Elgin Dairy Company," and similar masquerading firms was oleo. The Department reported, "In the month of June there were ignored by the grand jury of Allegheny county, 123 bills and the costs placed upon the county. In the month of September there were 394 bills ignored by the grand jury of the aforesaid county, and the costs placed upon our agent."[45]

In 1902 Congress passed the Grout bill which imposed a tax of ten cents a pound on oleo sold in inter-state commerce which was colored in imitation of butter and specified that the product be labeled oleo, not butter. The federal tax on uncolored oleo was one fourth of a cent a pound. A package of coloring matter commonly was included when the product was retailed. When the United States Supreme Court barred oleo manufacturers from coloring the product with palm oil in 1904, it was thought that the last hope of making yellow oleo legally had been dashed.

In spite of prohibitory laws, federal and state, much oleo continued to be sold as "genuine yellow butter." It was the intent of the Act of May 29, 1901, that oleo be free from any semblance to yellow butter. Enforcement was made difficult because of the vagueness of the terms used to describe color, since natural butter exhibits a wide range of tints commonly known as yellow. To meet this situation, on June 5, 1913, the State law was amended so as to express in more specific terms the limits beyond which colored oleo may not be legally sold. The following year the Department was able to report that since the passage of this amendment the sale of colored oleo in this State had practically ceased. Uncolored oleo, however, found a steadily increasing market as such.

The number of prosecutions for violation of the oleo law declined from 442 in 1908 to sixteen in 1915 and to three in 1924.[46] In 1913 oleo could be made for seven to thirteen cents a pound, which was less than half the cost of producing butter at that time. In 1920 the revenue to the State from oleo licenses was $585,000; this is evidence of the large volume of the trade.

Meanwhile it was becoming increasingly difficult for dairymen to justify their argument that the use of oleo is harmful to health. By 1905 it was made of pure products instead of the unsavory animal fats used in early years. Most brands contained only oleo oil, neutral lard, cottenseed oil, milk, and salt. Some of the best brands contained ten to fifteen per cent of butter, which smoothed out the oleo taste so that it was difficult to distinguish the product from pure butter. By 1940 some manufacturers were using soy bean oil or cocoanut oil and were adding vitamin concentrates containing vitamins A and D. This oleo approximated natural butter in taste and healthfulness, yet it had to be sold uncolored.

Oleo usually retailed at about half the price of butter. In spite of the price differential, its consumption was small as compared with that of butter; nevertheless the dairy interests continued to suffer from the competition. During the period 1920-1935 the per capita consumption of oleo averaged two to three pounds annually, while butter consumption averaged seventeen pounds. When the price of butter rose to about thirty-five cents a pound, the substitution of oleo increased.

MARKET MILK

Between 1880 and 1940 consumption of milk and cream per capita in Pennsylvania practically doubled. Consumption in Philadelphia increased even more rapidly, from twenty-two gallons a person in 1890 to forty-nine gallons in 1921. "The increased consumption of milk in Philadelphia from 1924 to 1929," say F. F. Lininger, and Hutzel Metzger, "was due to an increase in the per capita consumption as well as to an increase in population. . . . In the 5-year period per capita consumption increased 11.6 per cent."[47] This gain was due in large measure to publicity given to the value of milk in the diet, especially for children, by the National Dairy Council and the Philadelphia Interstate Dairy Council, through a newspaper and school educational campaign.

The large cities reached farther and farther into the country for their milk. In 1906 it was reported that with the exception of Bradford, Centre, Clarion, and Potter counties, all other sections reported that the shipping of milk to the cities was on the increase. In 1907 H. E. Van Norman stated, "The increasing demand by the people of Philadelphia for a high class market milk has induced the Pennsylvania Railroad to extend its milk shipping district from something like sixty miles to one hundred and fifty miles."[48] By 1913 this public carrier was "soliciting the hauling of milk [from Bradford and other northern counties] by way of Harrisburg and Philadelphia to Brooklyn. . . . [It] is hauling milk from Titusville to Philadelphia."[49] After 1920 milk was shipped long distances, sometimes 300 miles or more, in glass-lined refrigerator tank cars. By 1930 much milk was hauled to the city market by truck, either in tanks or in forty-quart cans.

Procedure in shipping milk in 1937 is described by John J. Scanlan: The producer either ships his milk to a country receiving station, or direct to a distributor in a market. The farmer may truck his milk to either place in his own truck or he may put it on a roadside stand to be picked up by a trucker employed by a number of producers; or by a truck operated by the distributor who runs the country receiving station; or by a truck owned by the cooperative that operates the country station. The country station receives milk from producers in near-by territory, weighs, tests and cools it. It is then shipped to the market in truck loads of forty-quart cans. In recent years the number of country receiving stations has declined and more milk is being transported directly to the market by truck. Fluid milk is shipped by truck to Philadelphia and New York from distances of 200 to 300 miles.[50] In 1937 only about one third of the milk supply of Philadelphia was shipped in by rail.

In no other branch of agriculture is there as much contention between producer, dealer, and consumer as in the marketing of fluid milk. This is due to its primary importance as food, its quickly perishable nature which requires a new supply daily, seasonal variations in production, and the large number of services that are necessary between the time when it leaves the farm and when it is delivered to the consumer. For many years there was almost constant strife between producers and distributors. In 1913 *Pennsylvania Farmer* voiced the long-standing exasperation of dairymen: "There is perhaps no department of farming today that is operating under such adverse market conditions as milk production. The frequent and increasingly exacting restrictions made by boards of health and dealers serve to keep the industry unorganized. . . . There is the constant danger of the product being thrown out of the market entirely because of some fancied or real irregularity in production. But added to this is the almost absolute control of prices by the dealers and distributing companies."[51] This unsatisfactory condition was felt most heavily during up-turn years of "dairy cycles," when the number of cows was exceptionally high. Such cycles occurred about every fifteen years.

To meet this situation, a number of producer cooperatives were organized, particularly between 1915 and 1917. Some moves in this direction had been made previously. In 1902 the "Milk Producers' Association of Western Pennsylvania and Eastern Ohio" fixed the price of milk from May 1 to September 1 at twelve cents a gallon.[52] Says J. K. Stern, "The immediate cause for the formation of [a number of milk marketing associations between 1915 and 1917] was the advancing cost of the production of milk while the price paid by milk buyers continued low. At that time most large milk markets were overcrowded with small independent dealers . . . and, since many of the small dealers had no facilities for handling any surplus, milk which could not be sold in fluid form often was returned to the farmers . . . the farmers' loss was large."[53]

Between 1915 and 1919 a wave of milk strikes by producers swept the country. Dairymen in the Pittsburgh milk shed staged such a protest in 1917 and those in the New York milk shed in 1919. Farmers refused to ship their milk because current prices were far below the cost of production. In a few cases they waylaid the trucks of nonconforming dairymen on the highway and dumped the milk. The Tri-State Milk Commission, members of which were appointed by the governors of Pennsylvania, Delaware, and Maryland, reported that "incomes show a yearly yield of $125.77 per cow, or almost $5 less than the total costs of maintenance per cow."[54]

In the large cities a few dealers gradually acquired prominence in the distribution of milk. According to the Tri-State Milk Commission, "In 1915, in Philadelphia, of 178 million quarts of milk received . . . six milk dealers . . . controlled 46.4 percent. . . . In this same city within the past few years 2,000 small milk dealers have been forced out of business by the increased efficiency and lowered costs of the larger firms. . . . It spells big business in milk distribution."[55]

There had been much wasteful overlapping in the distribution of milk. In 1913 it was reported, "I found 180 farms selling milk in Altoona, and there were 100 dealers. . . . There is continual strife and the farmer is getting a little better than three cents a quart for his milk . . . and the dealer gets five cents! . . . the consumer pays eight."[56] In 1936 the State Milk Control Board found that fifteen trucks owned by eleven different dealers were delivering a total of thirty-six quarts of milk and eight quarts of cream to thirty-nine families in one city block of forty-five families. In the smaller cities the milk marketing situation was chaotic.

PRODUCER COOPERATIVES

Milk marketing cooperatives give the farmer a voice in price determination; as an individual he has to accept the price offered by dealers or go without a market. When a cooperative functions efficiently the dairyman should receive a more equitable share of the consumer's dollar and the "spread" (the difference between the price which the consumer pays and that which the producer receives) should be reduced, but this has not always followed. In 1916 the dairymen of Pennsylvania were practically unorganized. By 1940 they were the most thoroughly organized group of farmers in the State.

The agencies engaged in the marketing of milk are more varied and their inter-relations are more complex than those of any other farm product. In 1940 they were of five general types: Producer-distributors, mostly in rural areas and small towns; retail distributors; grocery stores; wholesale jobbing companies; cooperatives. Cooperatives were of three types:

Collective bargaining associations, as the Inter-State Milk Producers' Association of Philadelphia. These sell the milk of their members, acting as brokers. Such associations have no facilities for handling the milk; they merely negotiate with dealers concerning prices and terms of sale.

Cooperative bargaining and operating associations, as the Dairymen's League Cooperative. In addition to selling the milk of their members, as brokers, these may own and operate facilities for the processing and distribution of milk, wholesale and retail. They may take title to the milk of the members, sell what they can to dealers, and process the balance.

Cooperative marketing associations. These perform the entire marketing function; they receive, process, and distribute the milk of their members. Many local cooperatives are of this type.

Regional milk marketing cooperatives which operated in Pennsylvania in 1940 included the Interstate Milk Producers' Cooperative, organized in 1916, which covered the Philadelphia milk shed; the Dairymen's Cooperative Sales Association, organized in 1916; and the Dairymen's League Cooperative Association, which covered the New York milk shed. The Dairymen's League was organized in 1907 as a bargaining association and was re-organized in 1920 as a cooperative bargaining and operating association. In 1940 these three organizations controlled about eighty per cent of all milk handled by cooperatives in this State. Each regional cooperative was organized into locals and the locals into districts for the election of members of the policy-making advisory council. "[In 1934] there were 41 farmer organizations actively engaged in the marketing of [Pennsylvania] milk; 9 were distributing milk, 5 were chiefly bargaining and selling organizations, 23 were operating manufacturing plants, and 4 were operating country plants."[57]

Organization of the Interstate Milk Producers' Association in October, 1916, was largely on the initiative of dissatisfied farmers of Chester County.[58] Since the milk supply of Philadelphia comes from points 250 or more miles away, the activities of Interstate cover a wide territory. The members are mostly in southeastern and south central Pennsylvania, but some are in New Jersey, Delaware, and Maryland. They sign contracts annually in which they agree to have the association handle all their milk. Amish and Mennonite farmers, who object to signing any kind of contract, are permitted to make the agreement orally. When not fixed by federal or State orders, prices are determined by bargaining between the cooperative and dealers. In 1918 Interstate and Dairymen's League agreed on their respective territory so as not to compete for milk in the same area.

Milk marketing cooperatives have been successful in securing better prices for farmers. The Dairy Committee of the "First Agricultural Conference" held February 20-21, 1923, reported that the high price of milk and its products during the early post-war period as compared with the prices of other farm commodities had been due to the fact that milk producers were better organized than producers of other farm commodities. The pooling of products and risks contributes toward the stabilization of the industry. Prices received for similar grades are thrown into a common pool by the Dairymen's League, so that low prices in one market are offset by higher prices in other markets and losses are spread over the entire membership. Producers are relieved of maximum business risks. The outstanding success of dairy cooperatives is due, also, to the fact that the price of fluid milk is set in a market where the bargaining power of the cooperative is pitted against that of a relatively small group of dealers.

By 1925 city milk markets were beginning to lose their former independence and to compete with one another in over-lapping territory. This was especially true of New York and Philadelphia. "At the present time," said R. W. Bartlett in 1926, "a train hauls milk daily from northwestern Pennsylvania to Philadelphia, a distance of 402 miles, while milk is hauled to New York through Philadelphia from country shipping stations less than 250 miles from Philadelphia."[59] It is not difficult to discover the reason for this competition; between 1900 and 1925 the market for fluid milk in Philadelphia increased from 95,000,000 to 263,000,000 quarts. Until about 1938 there was little competition for Pennsylvania milk from outside the State except from New York City and Baltimore. Then Boston entered the market indirectly. In 1948, it was stated, "Prices paid for milk in Boston, because of competition for supplies, are already a major influence in determining prices paid by the New York market. Philadelphia in turn is being affected by price changes in New York. . . . To find additional milk for the markets of the Northeast . . . [it] has been shipped into New England and the Middle Atlantic region from states as far west as Minnesota."[60]

Normally, Pennsylvania dairymen produce enough market milk to meet the needs of the State. For the five year period 1935-1940 they produced 4,500,000,000 pounds of milk annually. During this period there was shipped into the State an average of 465,000,000 pounds of milk annually, while at the same time 870,000,000 pounds were being shipped out of the State.[61]

THE PRICE OF MILK

One of the most difficult problems in marketing milk is to minimize fluctuation in supply throughout the year, which results in fluctuation in price. Market milk commands a higher price than milk used for other purposes; the average price that the producer receives depends largely on the percentage of his milk that is sold for fluid use. Prices are higher in the autumn and winter, when the supply is relatively lower, than during spring and summer. November, December, and January are the months of lowest production; during this period the supply of fluid milk may be actually less than the demand. May, June, and July are the months of highest production, when the supply may exceed the demand. About forty-per cent more milk is produced in June than in November. In 1921 the range of seasonal variation in the Philadelphia milkshed was fifty-four per cent.

To meet this situation, the "basic-surplus" plan was put into effect in the Philadelphia market in 1921 by the Interstate Milk Producers' Association in its bargaining with dealers. Basic milk was considered to be the average amount that the dairymen had produced during the months of October, November, and December. Amounts produced over this basic volume in other months were considered as surplus and the dairyman received lower prices for it, since much of this milk had to be sold for other than fluid use. The higher price for fluid milk in the fall and winter was an incentive to the dairyman to so adapt his methods as to increase fall and winter production and decrease summer production. Under the basic-surplus plan, in the five years from 1921 to 1925 inclusive the range of seasonal variation was reduced from fifty-four to twenty-three per cent.[62] It was, for the time being at least, an effective means of partly smoothing out seasonal variation in production and of securing for the market sufficient milk to meet the normal demand during the winter months. The basic-surplus plan was discontinued in 1933, with the advent of governmental regulations of milk marketing.

The economic advantage of proximity to market is evidenced by this statement: "Whole milk delivered at the local stations around Philadelphia in May, 1932, commanded a price 7 cents higher per 100 pounds in the 1 to 10-mile zone than in the 51 to 60-mile zone, and 14 cents higher than in the 101 to 110-mile zone. . . . This differential is greater for milk than for most other farm products; hence the tendency to specialize in fluid milk production near the cities."[63] The differential in price, however, may be partly or wholly offset by higher cost of production near cities.

During World War I there was an unprecedented demand for condensed milk; all milk was sold at a flat price and differentials were not used except as to butterfat and weight. At the close of the war the phenomenal demand for condensed milk ceased and the "classified price plan" was adopted. Under this the farmer received varying prices according to the use to which his milk was put, as for market milk, cream, ice cream, condensed milk, evaporated milk, butter, cheese. Milk used to make butter returned the producer about half as much as milk sold for fluid use. Different methods of pooling were used to determine the price paid the producer. "Of the total volume [of milk] handled by all dealers [in 1934], 58 per cent was used for fluid purposes, 12 per cent for fluid cream, and 30 per cent for manufacturing [evaporated, condensed, powdered, ice cream]."[64]

The wide spread in milk marketing is a perennial source of concern to farmers. In 1934 the retail price of a quart of milk averaged twelve cents. Of this sum producers received an average of six cents and distributors six cents. Farmers find it difficult to understand why they should not receive a larger share of the retail price—perhaps until they become producer-distributors themselves. "In 1934 there were 6,024 dealers or plants handling milk, including 889 pasteurizing distributors, 4,798 distributors of raw milk (mostly farmers distributing their own milk), 220 country plants and 117 manufacturing dealers. . . . It is estimated that about half of all milk and cream handled by Pennsylvania dealers passes through country plants."[65]

Pennsylvania farmers have little patience with strikes called by organized labor to increase wage rates, especially when these interfere with the marketing of farm products. On April 2, 1937, workers in the Hershey Chocolate Company plant at Hershey, Pennsylvania, staged a sit-down strike. More than 4,600 milk producers in Berks, Lebanon, Lancaster, Dauphin, Cumberland, and Franklin counties suddenly found the usual market outlet for their daily production of 800,000 pounds of milk closed. Some resorted to butter making, others fed part of their milk to hogs and chickens, but most of them had to pour it on the ground. The loss to these farmers was about $14,000 a day.

Farmers met this situation with forthright action. The sit-down strikers, some 300 to 400 men and women, had possession of the company buildings. After fruitless peaceful negotiations with the strikers by representatives of the farmers, on Tuesday the farmers, more than 2,000 strong from all over the area affected, appeared at the factory. "The challenge was hurled forth . . . by some unwise strikers, 'Come in and get us!' So the farmers went in and got them. . . . Shortly thereafter the management announced that the factory would open on the following morning. It did. Milk trucks again gathered up the farmers' milk as before, after a suspension of five days and a loss to the farmers of close to $70,000."[66] The recourse to strong-arm methods by these embattled farmers, of course, was unlawful but the inaction of local authorities seemed to make it necessary.

GOVERNMENTAL CONTROL OF MILK MARKETING

Prior to 1933 there was no governmental control or regulation of milk production and marketing other than through municipal and state sanitary requirements. For a brief period after World War I, Clyde L. King of the University of Pennsylvania served as "Milk Arbitrator" for the State. He was appointed in 1919 by the State Committee on Public Welfare on the recommendation of Governor Sproul and the Federal Milk Commission; he arbitrated milk price disputes in the Philadelphia and Pittsburgh milk sheds very fairly. *Pennsylvania Farmer* commented, "The appointment of a market 'arbitrator' in time of peace is a new venture."[67] So it was; it was the entering wedge in what ultimately may become a controlled agricultural economy. An official of the United States Food Administration said in 1918, "The most ticklish and irritating question that has come before the Food Administration is the market milk question. . . . If you fix [the price] too low, the farmer won't produce; if you fix it too high, the consumer stops eating; if you fix it at all, you are liable to throw the whole machinery of commerce out of gear and the whole nation must suffer."[68]

During and after World War I, control of the marketing of milk became an apparently permanent function of government. In 1930 the Federal Farm Board advised dairymen to slaughter one out of every ten cows in their herds, especially poor producers, and to reduce the number of heifer calves saved. This, however, was a recommendation, not an order. In 1933, amid crashing markets for farm commodities, the Agricultural Adjustment Administration was established by Congress. In August of that year a federal milk code or order was put into effect in the Philadelphia milkshed, ostensibly at the request of a majority of the producers for that market. This code established minimum prices for both producers and consumers. It pleased no one, partly because it was based not on current cost of production but on a fictitious and elusive value called parity. Parity prices, said federal authorities, were computed by applying to the composite price of the commodity during a base period the composite index of the prices paid by farmers for the things they bought for living and production.

The impracticability of certain aspects of this federal price control program is illustrated by the experience of F. S. Miley, a milk dealer of Ephrata, Lancaster County. In November, 1933, his license was revoked "because [he] paid producers less and charged consumers less than the prices prescribed in the agreement for the Philadelphia milk shed. Mr. Miley contended that he had not signed any agreement and therefore was not violating any . . . that the [federal] Secretary of Agriculture lacks jurisdiction in this case because his milk business is entirely within the state and not interstate. His defense was declared 'insufficient,' the Secretary of Agriculture holding that the marketing and distribution of all milk in the Philadelphia milk shed is 'in the current of interstate commerce.' "[69]

So many objections to the code were raised and so many revisions of it made that at the opening of 1934 it was stated, "None of us know what to expect."[70] The milk marketing situation was so chaotic that Governor Gifford Pinchot called a special session of the General Assembly in November, 1933, to consider means of relief. The Governor said, "Milk producers and milk consumers in Pennsylvania have long suffered unjustly from an unfair distribution of costs and profits. On the whole, many consumers have paid too much, many distributors have profited too much, and many farmers have received less than they should for their milk. . . . I recommend the creation of a Milk Control Board."[71]

The Governor's recommendation was enacted into law. The bill passed was a temporary emergency measure, to expire April 30, 1935. It provided for a board of three members appointed by and responsible to the Governor. The law enjoined the board to base its prices on "the amount necessary to yield a reasonable return to the producer and to the milk dealer," presumably commensurate with a fair price to the consumer also. It authorized the Board to fix minimum wholesale and retail prices to producers and consumers for defined classes of milk, by districts; to license and bond all milk dealers, and to hold hearings before issuing orders. It was expected not to fix prices in designated areas that were out of line with prevailing conditions of supply and demand in those areas. In short, the whole milk industry of the State, from producer to consumer, was brought under the control of the State government.

The first General Order was issued March 30, 1934. It divided the State into three areas—the Philadelphia milkshed, the Pittsburgh milkshed, and the remainder of the State. In each district it set a minimum price for each of four classes of milk and made this provision aimed at control of production: "The basic quantity of fluid milk which a producer may sell shall be an amount equal to the average monthly quantity of fluid milk which was produced by his herd, and was sold in fluid form during the two calendar years previous to January 1st, 1934."[72]

The attempt of the State Milk Control Board to control prices and supplies was comparatively fruitless. Court action against it was invoked by both producers and dealers. On August 4, 1934, the editor of *Pennsylvania Farmer* spoke feelingly about "the dislocations and complications resulting from the blunders of the Pennsylvania Milk Control Board, involving loss of markets and other losses to producers, processors and distributors in this state."

In April, 1934, the federal government again came into the milk marketing picture. The Agricultural Adjustment Administration had set up a nation-wide plan for the control of dairy production, the objective being to reduce the supply of milk ten to twenty per cent as compared with production in 1932 and 1933. This involved levying a processing tax on butterfat. The income from this tax was to be used to make benefit payments, at the rate of about $1.50 per hundred pounds of milk, to dairymen who agreed to reduce their output. When Secretary of Agriculture Wallace held a hearing on this control measure at Philadelphia on April 2 and 3, 1934, it had a very unfavorable reception; Pennsylvania dairymen felt that the processing tax was likely to be borne by the producer, not the consumer. There was conflict between the federal and State milk control. In 1936 the United States Supreme Court declared the Agricultural Adjustment Administration unconstitutional. This left the Philadelphia market in confusion.

Meanwhile the temporary State Milk Control law had been reenacted, on May 1, 1935. On April 28, 1937, a new law was enacted. It gave the Milk Control Commission broader powers. It declared control of the production and marketing of milk to be a permanent policy of the Commonwealth and empowered the Commission to "supervise, investigate and regulate the entire milk industry of this Commonwealth, including the production, transportation, disposal, manufacture, processing, storage, distribution, delivery and sale of milk and milk products in this Commonwealth, and including the establishment of reasonable trade practices, systems of production control and marketing area committees in connection therewith." The law made it mandatory upon the Commission to fix wholesale and retail prices "after hearings and testimony" from producers, dealers, and consumers, and to classify milk by grades, and gave it certain jurisdiction over milk cooperatives. The Commission had "power to enter any premises where milk is produced or handled in any way." It was authorized to audit the books of dealers, to license weighers, samplers, and testers, and to require dealers to post bond and be licensed.

This was the most far-reaching delegation of authority to government in relation to agriculture ever enacted in Pennsylvania and was a long step toward the socialization of agriculture. The movement to make State control of milk production and marketing permanent was supported by the large producer cooperatives and by consumers; dealers did not oppose it. It was opposed by the State Grange, especially the price-fixing feature. Said the Pennsylvania State Grange, "There is a growing realization that State Milk Control Boards cannot repeal the laws of supply and demand and that only supermen can change the economic forces which normally control milk prices over so vast an area as Pennsylvania, with its many markets of diverse conditions. . . . A State Milk Control Board cannot control Interstate Commerce in milk which means a portion of the milk sold in the State is subject to and another part is exempt from control."[73]

In June, 1936, the Supreme Court of Pennsylvania handed down a decision upholding the constitutionality of the milk control law of 1933, which was essentially the same in principle as the law of 1937. This put new life into the Milk Control Board and the Commission that succeeded it. Observance of their orders became more general. Dissatisfaction continued in some quarters, however. In 1937 the Commission prosecuted a Dauphin County dairyman who sold about 1,500 quarts of milk daily. He stated, "I was prosecuted August 26th, 1937, and fined $50.00 and costs (total, $60.80) by the Milk Control Board for serving and selling cream testing 6½% above standards set by the above board and receiving five cents per ½ pint less than the regular price. I do not consider it a crime to be more than fair in producing, serving and selling a product testing above standard."[74] The Board justified its action by arguing that this practice would have a tendency to break down standards established by the Board.

The price-fixing aspect of the law was under almost constant fire, especially from producers. In 1941 the President of the Pennsylvania Dairymen's Association expressed this opinion: "After six years I think it is admitted by everyone who knows the history of milk control in Pennsylvania that there is almost complete failure of enforcement of resale prices in all parts of the state."[75]

In 1940 the intricate and highly controversial question of governmental control of the production and marketing of milk, especially price-fixing, was still an open issue. Supporters of the policy asked if it was really price-fixing when the Commission merely set prices which were, in fact, determined by the supply and demand factors in each area as developed at hearings at which producers, dealers, and consumers had an opportunity to testify. More and more, the weight of public opinion seemed to be veering toward the point of view that milk, because of its primary importance as food, should be considered a public utility and that its production and distribution should be regulated by government, in the public interest.

OTHER OUTLETS FOR MILK

In 1940 fifty-seven per cent of the milk produced in Pennsylvania was sold as bottled milk, fifteen per cent as ice cream, twelve per cent as bottled cream, seven per cent as butter, five per cent as milk chocolate, two and a half per cent as cheese, and one and a half per cent as condensed or evaporated milk.[76] Among minor milk products are buttermilk, dried curd, modified milk, sugared milk, milk powder, milk sugar and malted milk.

Since 1900 the ice cream industry has had a phenomenal growth. In 1928 it was estimated that the people of Pennsylvania ate over 50,000,000 gallons of ice cream annually, an average of five gallons a person. In 1930 Pennsylvania produced about fourteen per cent of the total output of the nation. Philadelphia is the ice cream capital of the United States; in 1930 one plant there produced more than the output of twenty states. In 1909 the General Assembly passed an act making unlawful certain practices that had prevailed previously, especially the use of boric acid, formaldehyde, saccharine, and synthetic flavors. The Ice Cream Manufacturers Association of Pennsylvania was organized in 1907. Until about 1925 a considerable number of dairymen made ice cream commercially; thereafter the business was taken over by milk distributors and specialized ice cream plants.

Milk condenseries became established in the northern counties, where the cost of production is relatively low, before 1900. Until World War I they were a minor factor in the trade; then the demand for condensed and evaporated milk for shipment to Europe became so great that the price of market milk was affected to a marked degree. For the three-year period before the war the United States exported an average of 17,000,000 pounds annually. For the year ending June 30, 1917, the shipment was 259,000,000 pounds; the following year it was 853,000,000 pounds. By 1923 exports had declined to 58,000,000 pounds. Such sharp fluctuations in demand spelled disaster to some farmers in the northern tier of counties. By 1940 most condenseries were in chains owned by large corporations which sold a branded product. Usually they paid farmers a price sufficiently high to make selling milk to them somewhat more profitable than making it into butter but lower than the price of market milk. Condenseries were used mainly as by-product plants to utilize surplus milk when the price of market milk fell below a certain level.

Cheese making now is a minor phase of the dairy industry of this State; at one time it was a close competitor of butter. The type of cheese most commonly made is whole milk cheese, also called cheddar or full-cream American cheese. Much skimmed milk cheese is made, also, especially in the southeastern counties. Cottage cheese or *schmierkäse* and boiled cheese or *breikäse* are made in large quantity in German communities, especially in Lancaster County. "When the depression [of 1932-3] hit the dairy industry many Lancaster county farmers lost their market, while others got as little as 60¢ per cwt. for milk. Then a group of [sixty-four] Amish farmers called a meeting and [built a plant for converting their milk into Swiss cheese, importing a cheese maker from Switzerland.] Their milk, converted into Swiss cheese, now is netting them $1.35 per hundred pounds."[77] The revolt of these farmers was due, also, to impatience with governmental control of the market milk industry and to their unwillingness to deliver market milk on Sunday.

DAIRY ECONOMICS

The financial well-being of a majority of Pennsylvania farmers is dependent primarily on the size of the monthly or weekly milk check. It is the principal source of income of farmers in forty of the sixty-seven counties. Pennsylvania dairying represents an investment of more than $1,000,000,000. Consumers pay about $250,000,000 annually for Pennsylvania milk.

In 1940 the milk-producing industry of Pennsylvania comprised 879,000 cows and heifers two years or more old. These were kept on 124,000 farms or three-fourths of the total number. Most of the herds were small, averaging seven cows, which produced an average of 5,054 pounds of milk. The sale of milk, cream, butter, and other dairy products amounted to about forty per cent of Pennsylvania farm income. The most important dairy counties were Lancaster, Chester, Bradford, Crawford, and Susquehanna.[78] Milk production was more intensive in Chester County than in Lancaster County, but the latter had nearly twice as many farms and more cows. In 1940 Lancaster County ranked as the seventh county in the United States in dairy production. In Susquehanna County, eighty-six per cent and in Tioga County, eighty-four per cent of the farm commodities sold were dairy products.

The geographic distribution of cows has changed materially since 1900. Dairy herds are not now as much concentrated near large cities but are more generally distributed throughout the State. Since 1900 there has been a tendency for dairying to increase in the northern counties and to decrease, relatively, in some of the southeastern counties. In 1890 Chester, Bucks, and Berks counties accounted for about twenty-one per cent of the total milk production; in 1924, less than sixteen per cent. The main reason for the gradual movement of the industry away from cities is urbanization of land, resulting in higher valuation, and improved methods of transporting milk.

The fortunes of dairymen have fluctuated sharply since 1900. In 1939 C. W. Pierce stated, "Prices Pennsylvania farmers receive for milk follow the up-and-down movements of prices of 40 basic commodities such as cotton, wheat, rubber, copper, lard and scrap iron. . . . State control [of milk marketing], apparently, has not been effective in changing the natural course of milk prices. . . . In the future, as in the past, milk prices may be expected to follow the movement of prices of other commodities. Trying artificially to push milk prices to a level above other prices will continue to be about as effective as pushing on the end of a string."[79]

The period from 1900 to 1920, was not, in general, remunerative to the dairyman. The average price paid to producers for four-per-cent milk in the Pittsburgh market during the year 1904 was ninety-six cents a hundred weight, which was below the cost of production.[80] The year 1908 was especially trying; a severe drought together with high prices for feed and low prices for milk and butterfat made the account book of many a dairyman show a deficit. In 1910 milk was retailing in Philadelphia for nine cents a quart. In 1917 many dairymen sold their cows to the butcher for beef, which then was in great demand and unusually high in price because of the war in Europe, whereas milk prices were low and feed costs exorbitant.

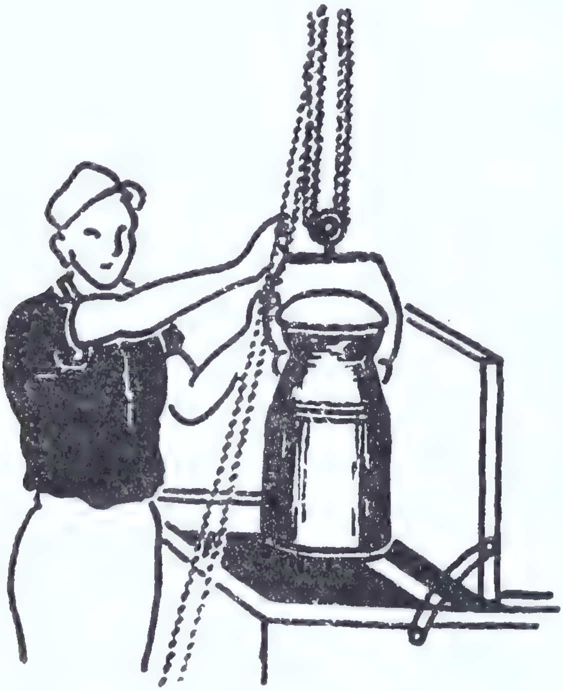
From 1916 to 1919, dairymen in some sections struck for better prices and dumped the milk cans of their fellow farmers who attempted to make deliveries to dealers. Said *Pennsylvania Grange News,* "When Bedford County receives a minimum of 60¢ per hundred pounds net for milk—a trifle over 1¢ per quart—it is high time we begin thinking of the standard of living this is bound to establish for the dairyman."[81]

Then followed a brief period of relative prosperity in some areas but not in others; this terminated about 1930. According to the Pennsylvania Department of Agriculture, the average wholesale price of milk in January, 1919, was thirty-five cents a gallon. In 1920 the average price of four-per-cent milk in the Pittsburgh market was $3.62 a hundredweight. By 1931 the retail price of milk in Pittsburgh had been reduced to nine cents a quart and the price to producers to $1.10 per cwt. at country shipping points. In 1933, it is said, a disgusted dairyman wrote to a poultry hatchery, "Enclosed find check for $2.01 for which send me your best grade of chicks. This is my total milk check for the week from five cows."[82]

"After 1933," said W. L. Barr, "prices of products other than milk rose more rapidly than milk, but milk prices have been relatively more favorable than other farm products since 1937."[83]

The period closed on a rather sour note. Cost accounts kept by seventy-nine farmers in four parts of the State, as compiled by the Agricultural Extension Service showed: "In 1938, it cost an average of $2.13 for the dairyman who kept records to produce [100 pounds of] milk which sold at an average price of $2.12; in 1939, $2.34 to produce milk which sold at $2.08; and in 1940, $2.32 to produce milk which sold at $2.24."[84] A study of the economics of 340 representative dairy farms made by the same public agency revealed that labor incomes varied from minus $3,681 to plus $7,452; one-fourth of all farms had minus labor incomes, while only sixteen farmers, or five per cent of the total, had labor incomes of $2,250 or over. The obvious conclusion is that profit in dairying depends fully as much upon the quality of the farmer as upon the quality of the farm and its livestock; it is not profitable to be an "average" farmer.

Notwithstanding the fluctuating fortunes of the dairyman he is, all things considered, the most stable element in the farm population. Dairymen now are better organized than any other farm group and thereby have received somewhat larger returns for their products than in former years. Moreover, governmental regulation is more pervasive in dairying than in any other farm enterprise.



Lifting cans of milk from the cooler

X

LIVESTOCK FARMING

LIVESTOCK is the backbone of Pennsylvania agriculture. In 1936 livestock and livestock products accounted for seventy-two per cent of the cash income of Pennsylvania farmers; field crops, twenty-eight per cent.[1] Pennsylvania is a grass state; the primal food of livestock is grass. Dairying is by far the most important phase of livestock farming; but poultry, beef cattle, sheep, swine, horses, and mules, in the aggregate, represent a large amount of farm income. Since 1840 there has been a decided reduction in the number of beef cattle, sheep, swine, and horses; but a large increase in poultry, which now is a primary industry, second only to dairying.

SHIFTS IN THE LIVESTOCK INDUSTRY

Practically every Pennsylvania farm carries some livestock. More than four out of five have cattle; three out of four, swine; and nine out of ten, poultry. The average value of livestock to an acre of farm land increased from $2.78 in 1850 to $9.19 in 1925.[2] The maximum expansion of the livestock industry in number of animals was reached in 1880, when the animal units totaled 2,900,000. Since then the trend has been downward, save for poultry.

Soon after 1840 competition from the West became so keen that the livestock interests of the State, other than dairying, suffered seriously. Cincinnati became "Porkopolis." In the absence of refrigeration, however, fresh meat could not be shipped a long distance. The first shipment of meat in refrigerator cars was from Chicago to New York in 1869. The immediate success of this venture gave impetus to the pork-packing and dressed-beef industry of the Mississippi Valley. In 1862 Nelson Morris, in 1867 Philip Armour and Brothers, and in 1875 Gustavus F. Swift began meat packing at Chicago, which then became the national capital of the industry, as it is today.

Western competition soon throttled the relatively small meat packing industry of Pennsylvania. By 1910 only a few stock yards were still open; those at Philadelphia, Pittsburgh, and Lancaster handled eighty-five per cent of the livestock dressed in the State. Practically all the meat sold in the larger cities came from the West. Part of the supply of pork and a little beef consumed in the smaller cities and towns came from small local packing houses and from farms. Local butchers naturally resented this encroachment on their business and sought, without success, to convince the public that chilled meat from refrigerator cars was unhealthy, which was not true. The concentration of the meat packing industry in the West could not be stayed. Considerable meat, mostly pork, still is dressed on farms, primarily for home use. Usually farmers can dispose of any surplus to advantage locally.

Prior to 1900 sanitary conditions at many slaughter houses, especially on the premises of local butchers, were far from satisfactory, sometimes positively filthy. The United States Supreme Court decision of 1873 gave impetus to efforts by states and municipalities to regulate conditions under which meat is prepared, stored, and sold. Little was accomplished in Pennsylvania until after 1903, when the federal government enacted a meat inspection law, which, however, applied only to interstate commerce. Pennsylvania was the first state to enact such a law, effective May 25, 1907. It provided for inspection by the Pennsylvania Department of Agriculture of the premises of butchers, slaughter houses, packing houses, storages, canneries, and markets. At that time, according to the State Veterinarian, "There are one hundred and seventy [slaughter and packing houses] in Philadelphia and a hundred or more in Pittsburgh, and scattered all over Pennsylvania, in the smaller towns and rural districts, there are small slaughter houses engaged in local business."[3] Marked improvement in sanitation resulted from the enforcement of this law, which was revised on May 28, 1915.

After 1910 more attention was given to the use of superior purebred sires. Between 1910 and 1916 a number of local groups, as the Warren County Farmers' and Breeders' Association, were organized for breeding better cattle, swine, sheep, and horses. In 1916 it was estimated that the number of purebred bulls in the State was 8,800; boars, 7,400; rams, 3,490; stallions, 1,500. The re-discovery of Mendel's law of heredity in 1900 gave impetus to the breeding of livestock as well as crops. There are two types of livestock breeders; men of means to whom this is an engrossing avocation, and professional breeders. Usually they handle but one breed, which they promote with competitive fervor.

During World War I, especially from 1914 to 1918, the price of livestock and meat reached the highest point in history. There were several causes aside from war-time demand—sub-division of western ranges into dry farming for the production of wheat; slaughter of an unusual number of veal calves, lambs, and small pigs; and high cost of feed and labor. Roaster pigs were sold when eight to ten weeks old, lambs when forty to sixty pounds. In September, 1917, cattle reached the unprecedented price of $17.90 a hundredweight. In May, 1917, hogs were quoted at $20 a hundredweight.

These stratospheric prices were due in large measure to the war-time emphasis on the production of grain, especially wheat, for export to

Europe. The Pennsylvania Department of Agriculture in 1918 pointed out that meat developed from grains was an expensive food, and that the grain itself would go further toward sustaining people than the meat it produced; the problem for livestock feeders was to use as much roughage and grass as possible, with a minimum amount of grain.[4] There were "meat strikes" in some large cities but these could not change the economic law that had brought about the situation.

The hectic livestock market of World War I collapsed in 1920, and a prolonged period of depressed prices followed. Prior to 1921 livestock production was financed mostly by local banks. After the collapse of the market that year, the federal government began to extend credit to livestock farmers through Intermediate Credit Banks. With the establishment of the Farm Credit Administration in 1933, sources of credit were made available through regional Production Credit Associations. "In 1934 governmental agencies were extending seventy per cent of the credit to the livestock industry, commercial banks eighteen per cent and other agencies twelve per cent."[5]

Consumer preference in meats changes constantly; this has an important influence on production methods. Cattle, hogs, sheep, and poultry are marketed at a much younger age than formerly because consumers prefer lighter cuts of meat as well as because this is more economical for the farmer. In recent years the quick freezing of meats has introduced a new and unpredictable element into the marketing process.

POULTRY HUSBANDRY, 1840-1900

Little advance was made in poultry husbandry until after 1900. The prevailing attitude toward poultry was, "Let them scratch for a living"; and returns were correspondingly low. Few farmers were willing to "fuss with hens." Most chickens were kept in small flocks on general farms and were considered to be the particular charge of the women. They bartered for groceries eggs they had gathered from the hay mow and fence corners or they husbanded their "egg money" to spend for strictly feminine purposes.

The care of poultry did not become a full-time job for men until after 1900. Said the Dean of American poultrymen, James E. Rice, "The poultry industry was about the last of the agricultural industries to grow up. Long after animal husbandry, dairying, horticulture and kindred fields were moving in the best agricultural society, poultry keeping was still an incorrigible. When folks wanted to describe an impractical visionary they said, 'He is the kind of a man who goes into the chicken business.' It was as much as any man's reputation was worth to let it be known that he really believed that money could be made on a chicken farm."

The average hen produced few eggs, chiefly because of poor breeding and poor feeding. "From 70 to 75 eggs per hen, a year," said *Farmers' Cabinet* in 1845, "would be a fair estimate, for any number of fowls kept together."[6] Most eggs were laid in the spring and summer. Chicks were reared under broody hens, and only in the spring; it was thought to be impossible to raise thrifty chicks in the winter or in confinement. The largest concentration of poultry production was near Philadelphia, especially in Bucks and Delaware counties. In 1848, "The number of hens kept permanently in the county [Delaware] is estimated at 80,000, or 18 to each family; worth 25 cents each, producing an average of 72 eggs and three chickens annually, the former worth 15 cents per dozen."[7]

Between 1850 and 1858 occurred the first outbreak of "hen fever." This highly contagious but not mortal disease was confined almost wholly to urban residents; farmers, for the most part, were immune. "Never perhaps has the 'hen fever' prevailed to as great an extent in Pennsylvania, as at this time," commented the editor of *Pennsylvania Farm Journal* in 1852. "We are literally crowded with inquiries from every section of the State."[8] The mania was mostly for breeds with fancy plumage, not for high-producing fowls. Poultry exhibitions—state, county, and community—were the rage. At an exhibition held in Philadelphia in 1852, three Cochin China birds sold for $100; two Chittagongs for $50; two Canton Chinese for $80; two Shanghai for $75. Similar prices were paid for other fancy breeds. One highly ornamental Shanghai rooster brought $100.

Among breeds popular with fanciers at that time were Gray Dorking, White Dorking, Black Spanish, Jersey Blue, Poland China or Topknot, Buff Shanghai, Red Shanghai, White Shanghai, Malay, Golden Spangled Hamburg, Creole, Bunty or Tailless, Silky, Austrian, Frizzle, Creely, Brahmapootra, Dominique, and Bantams of numerous kinds. More people were enamoured with Shanghai, Brahma, Cochin China, and Dominique than with other breeds. Cochin China fowls were known as "Celestials"; it would have been an insult to these royal birds to require them to associate with common barnyard fowls.

The activities of the State Poultry Society, organized on September 24, 1852, centered almost exclusively around fancy breeds. The annual exhibition of this society held in Philadelphia November 26-30, 1855, was described as "one of the most successful ever held in the United States. . . . The number of coops on exhibition was 645, and the number of specimens over 6,000."[9] By 1858 hen fever had run its course. Only the breeders had profited by it. The "dung hill fowl" of no particular breed retained possession of the barnyard.

Between 1900 and 1910 there was a brief recurrence of public enthusiasm for fancy breeds. In 1914 the Pennsylvania Department of Agriculture referred to "the slump in the fancy poultry business. Of the some hundred and ten poultry associations in the State, something like one-third dropped their annual poultry show this year. . . . About one-third of the entire number of poultry . . . 'fanciers' have quit as such. . . . *The general public more and more is interested in poultry only so far as it will lay eggs and grow pounds of meat and only a comparatvely small number wish to keep and breed poultry as a 'fancy.'*"[10]

By 1875 poultry husbandry had begun to assume some commercial importance near Philadelphia, particularly in Bucks County. In 1877 A. M. Dickie of Doylestown reported to the State Agricultural Society, "Poultry keeping is regarded by the masses as an insignificant business, adapted to, and conducted by, the women-folk and children. . . . This view will have to be modified. There are at present . . . men, and women too, who are paying particular attention to the cultivation of poultry and eggs. . . . If almost any of our farmers were asked to name the most important business . . . in our county, [Bucks] he would unhesitatingly say dairying. . . . But as a source of income, dairying, even in our county, must be subordinate to poultry keeping. . . . The products of our poultry yards are worth $2,000,000 a year. . . . Philadelphia is our principal market."[11] In 1891 Eastburn Reeder of Bucks County made the following financial statement on his flock of 150 chickens:[12]

1,603 doz. eggs a year @ 22¢ a doz.	$352.66
Cost of keeping 150 hens @ $1.00 each	150.00
Net profit on 150 hens	$202.66
Average annual profit a hen, $1.35.	

This estimated profit was considerably above the average. Egg production a hen continued to be low. The census of 1880, which was the first to give serviceable poultry statistics, revealed that the average for the State was only sixty a year. The total number of chickens in the State in 1890 was 6,734,000 and the total income from poultry, eggs, and meat was $10,613,000.

Production methods remained about as they had been for centuries. For the most part, chicks were hatched in the natural way, often by secretive biddies in stolen nests. Methods of hatching chicks with artificial heat were known before the Christian era; crude incubators

This hen laid 296 eggs in her pullet year

were introduced in France and England in the eighteenth century. The first patent on an incubator in the United States was issued in 1847. In 1856 an "artificial egg hatcher" was highly advertised: "It consists of a water-tight platform or tray of metal . . . filled with warm water, at such a heat as will keep a layer of sand thereon up to a temperature of 104° F. This sand-layer holds the eggs, which are screened by a glass-cover . . . [and] covered with a blanket." The heat was derived from a simple spirit lamp.[13] Various types of home-made hatchers were used somewhat but were wholly unpredictable as to results; frequently they went up in smoke. Not until after 1900 did incubators become popular.

After 1875 White Leghorn, Brown Leghorn, and Barred Plymouth Rock began to supplant Shanghai, Cochin, Dominique ("Dominecker"), and common barnyard fowls. White Leghorn was valued most for egg production, Plymouth Rock for meat. Pennsylvania has not produced a distinct breed of chickens, unless it be the Bucks County Fowl, which was popular in the southeastern counties from 1830 until 1875. In 1847 it was reported of this breed that "the cock, about nine months old, weighed eight and a half pounds." Adrian Cornell of Bucks County said they had been bred on his farm for more than forty years. They probably belonged to the Malay tribe and attained wide celebrity.[14]

In some rural districts poultry production was made hazardous by the depredations of foxes, weasels, hawks, and other predators, since most flocks had free range of the farm. On June 23, 1885, the General Assembly passed the Scalp Act for the protection of poultry. This provided a bounty of fifty cents each on hawks, owls, weasels, minks, and foxes. The Act was amended in 1889 to exclude hawks and owls, which were found to be more beneficial than harmful to the farmer because of their destruction of mice. In 1889 it was reported, "The only wolf which has been killed in Pennsylvania for the last ten years was shot early in the winter of 1885, in the township of Clinton, Wayne county. . . . Foxes—particularly the red fox . . . are quite abundant . . . throughout the State. In mountainous regions and heavily timbered districts where wildcats are reported to be quite plentiful they destroy, it is stated, much game and poultry."[15]

BOOM TIMES, 1900-1915

Between 1900 and 1915 the poultry industry experienced flush times under the stimulus of continuing high prices. It was extensively advertised as an easy means of getting rich quick. Many inexperienced town dwellers went into the chicken business, often far beyond their means. Some of the more ambitious poultry plants established during this hectic period represented an investment of many thousands of dollars. Calculations of expected profits by amateurs made no allowance for flock mortality or for their own lack of experience. In 1896 one bemused neophyte set forth this enticing prospect: "Let us begin with one healthy young hen; let us suppose that she and her progeny will live seven years . . . and rear two broods of thirteen chickens every season; let us suppose . . . half her chickens are cockerels, almost all of which will be killed. . . . At the end of the first year we have the original hen and thirteen chickens, making 14; at the end of the second year, 196; at the end of the third year, 2,744, and so on to the seventh year, and we have the enormous number of 105,413,504 . . . which, at the low price of ten cents each, would make us worth over ten millions of dollars."[16] It was all so simple and so profitable—on paper.

Between 1900 and 1910 the number of poultry increased seventy per cent. Most of them were kept by enthusastic amateurs and many were of fancy breeds. Never before were there so many and so large poultry shows. In 1910 "Pennsylvania has . . . one at least [organized poultry association] in nearly every county and in some counties two and three and even four. Its State organization, known as the Pennsylvania Branch, American Poultry Association, includes all the larger and most of the smaller of these organizations as members."[17] In 1910, it was stated, there were held "Close to one hundred poultry shows, including some of the best and biggest shows in the country, as at Philadelphia, Pittsburgh, Scranton, Williamsport and Allentown. The total paid attendance at these Pennsylvania shows must have been upward of a quarter of a million. And yet the percentage of pure bred poultry on the farms of Pennsylvania is as yet relatively small."[18]

Many poultry novitiates paid large sums for the privilege of using so-called "poultry systems," the promoters of which intimated that great wealth was likely to result if instructions were followed explicitly.

This effervescent period of highly-speculative poultry husbandry came to an abrupt end in 1915. Very few who had been drawn into it made a financial success of the enterprise; many lost heavily. The Pennsylvania countryside was dotted with abandoned poultry houses, mute evidence of the folly of "going into poultry" without adequate experience.

Meanwhile poultry production by experienced men was making marked progress. Improvements in incubators and brooders made these facilities practicable and gave a tremendous boost to the industry. Cold storage of eggs and dressed poultry gave greater stability to the market. Millions of eggs were used in the arts, as in the making of dyes, in printing, and in photography. After 1930 the shipment of incubator chicks in ventilated cartons by rail, truck, or air revolutionized the industry. Marked progress was made in the science and practice of breeding and feeding and in disease control. Flock mortality was reduced by sanitary and dietary measures and by selective breeding. Mechanical feeders and other labor-saving devices appeared. The average egg production in the best flocks was over 200 a bird. Within a quarter of a century poultry husbandry was transformed from a comparatively minor phase of general farming into a highly specialized industry and the second largest source of income of Pennsylvania agriculture. It was an amazing development.

Progress was stimulated by the State Poultry Association, organized in 1912. In 1935 its membership jumped from a few hundred to 5,000, and in 1937 to 18,000, representing every county. This phenomenal increase was due not only to the excellent educational service of the Association but also to a unique plan under which members secured protection from loss of chickens by theft through tattoo marks on the birds. The National Poultry Council, organized in 1925, was serviceable in formulating general policies for the industry.

Prior to 1908 the Pennsylvania Agricultural Experiment Station conducted no poultry research. From 1903 to 1909 the "Stockman Poultry Experiment Farm," supported by *National Stockman and Farmer,* made useful tests of different feeds and methods of flock management. The first special State appropriation for poultry research at The Pennsylvania State College was in 1905, when $1,250 was earmarked for this purpose. The first research bulletin, "Some Poultry Experiments," by T. I. Mairs, was published in 1908. One of the major objectives in the organization of the State Poultry Association in 1912 was to secure a Department of Poultry Husbandry at the College. This was realized in 1918, after which the department made increasingly important contributions to the industry through research and instruction.

The drift toward concentration of the poultry industry in the hands of specialists, which began about 1900, continued. It has not proceeded as rapidly as with some other farm industries, partly because comparatively small flocks fit in well with the dominant farm enterprise of the State—dairying. In 1935 poultry were kept on ninety per cent of Pennsylvania farms; the average size of the flock was ninety hens. More than three-quarters of all the chickens in the State that year were in flocks of 400 or less, six per cent in flocks of 1,000 to 2,500, and only two per cent in flocks of 2,500 or over. Although most chickens still are in small flocks, the number of flocks of 1,000 or more increased eighty per cent between 1930 and 1940. There were several flocks of 3,500 to 5,000 layers. The largest poultry plant in the State in 1939 was at West Sunbury; it comprised 35,000 White Leghorn layers.[19]

In 1940 Pennsylvania ranked first in cash income from poultry products. Four of the first ten counties of the nation in this respect were in this State—Lancaster, York, Bucks, and Berks. Other counties which specialized heavily in poultry were Montgomery, Chester, Butler, and Bradford. Twenty per cent of the cash income of Pennsylvania farmers in 1940 ($38,834,000), was derived from poultry. In no other branch of agriculture has progress been so rapid and changes so revolutionary. Some poultrymen now specialize in egg production, others in meat production, still others in incubation. The rise of commercial poultry husbandry since 1900 is one of the most outstanding features of Pennsylvania agriculture.

FLOCK IMPROVEMENT.

Since 1900 purebred birds have practically superseded the mongrel fowls of former years, even in small flocks. The establishment of hatcheries in many parts of the State made it easier and more economical for farmers to purchase purebred day-old chicks than to raise them. From 1900 to 1940, Single Comb White Leghorn, an imported breed, dominated commercial flocks for egg production; and Barred Plymouth Rock, which originated in New England about 1860, for meat production. Beginning about 1920, Rhode Island Red, which originated in that state, began to find favor; and a little later, its more profitable descendant, New Hampshire Red; but Pennsylvania remained primarily a White Leghorn state until after 1940. In 1935 over ninety per cent of all the chickens in commercial flocks were of that breed.

Breeding poultry for hatchability, livability, high egg production, and disease resistance began soon after 1900. As in the improvement of the dairy cow, the aim was to establish certain families or blood lines which had demonstrated superiority in these respects through several generations. After 1900 poultry breeders began to keep records of the performance of each bird by means of leg banding and trap nesting.

In 1924 the Pennsylvania Department of Agriculture initiated a Breed Improvement or Poultry Standardization Program. Under this, breeders who pedigree-bred and trap-nested birds having the standard characteristics of the breed, and whose flocks were regularly blood-tested for bacillary white diarrhea, could qualify for a certificate, provided each pullet laid 200 or more eggs the first laying year, averaging twenty-four or more ounces a dozen. Three classifications or degrees of excellence were recognized—Supervised, Record of Performance, and Certified. This program was intended to accomplish for the poultry industry what cow-testing associations do for the dairy industry. In 1924 five flocks comprising 3,100 birds were under this plan; in 1939 there were 518 flocks and 358,509 birds. In this year 2,304 birds in nineteen flocks qualified for the coveted classification of Record of Performance.

After 1916 flock production was increased by culling—the removal of poor birds on the basis of their conformation or physical appearance. Culling eliminates diseased, weak, and under-sized birds and those that have the physical characteristics of poor layers. By 1940 practically all large commercial flocks were culled.

The average number of eggs produced by a hen increased from sixty in 1840 to 150 in 1940. Because of the short period between generations, there is no other kind of livestock except the pig in which average production may be increased so quickly. Many of the trap-nested, progeny-tested flocks in commercial henneries average 200 eggs a bird annually; some, 225 or more. In 1936 the 1,622 hens under the Record of Performance program averaged 235.9 eggs.[20]

The standard in egg production a hen has risen constantly. In 1910 a correspondent of *National Stockman and Farmer* challenged the assertion "that the hen that lays 200 eggs in a year has exceeded her capacity . . . [that] the production of 200 eggs in a year, is an abnormal demonstration which can only be achieved at the expense of lowered or destroyed vitality and which must make transmission of this characteristic forever impossible."[21] Within ten years 200-egg hens were common; and by 1940, hens which laid 300 or more eggs were reported. In 1915 the hen "Lady Eglantine," at a Greensboro, Maryland, farm owned by A. A. Christian of Philadelphia, set a new world's record in the Philadelphia *North American* egg-laying contest with 314 eggs in one year.[22] In 1928 it was reported, "A White Leghorn hen owned by Theodore Wirtanen of Erie county, Pa., has set a new record in egg production for the United States. She produced 347 eggs within a year . . . [She] started on her egg-laying record as a six-month-old pullet."[23] In 1929, "A Barred Rock hen, 'Lady Victorine,' owned by the University of Saskatchewan, Canada, has established a new world's individual continuous laying record by turning in a score of 358 eggs in 365 days."[24] There is no evidence that the vitality of these highly productive birds or their offspring has been impaired. Commercial flocks that average 275 eggs a year, or more, are likely to become common.

High production a hen has been promoted by egg-laying contests. The first such contest in Pennsylvania was at Thorndale, Chester County, in 1913; it was conducted by the Philadelphia *North American.* In 1931 the General Assembly appropriated $85,000 to establish an official egg-laying contest at Harrisburg to be conducted by the Pennsylvania Department of Agriculture. This is the largest contest in the United States. It opened October 1, 1931, with 100 pens of birds, each pen of thirteen pullets. The hens in the highest pen that year averaged 256 eggs each; the record performance of a single bird was 326 eggs.

CHANGES IN FLOCK MANAGEMENT

Since 1920 there have been marked changes in methods of rearing and managing poultry. Chicks now are reared at any time of the year, not solely in the spring as in former years. The absence of adequate sunshine during the winter months creates a problem in vitamin deficiency; this is met by adding cod liver oil or other vitamin D supplement to the diet. Few chicks now are hatched under hens. The job of the modern hen is to lay eggs for market, not to rear a brood of chicks; incubators and brooders do this more efficiently. No longer does the farmer have to duck broody hens in the watering trough to break up their setting proclivities; the common phrase, "as mad as a wet hen," is derived from this humiliating avian experience. Now that her maternal functions of hatching and brooding have been abolished, will the hen show a disposition to stop laying eggs? The answer to this question lies within the realm of speculation; as yet there is no evidence that man is to be penalized for interfering with the processes of nature in this respect.

With the development of the mammoth incubator, about 1910, custom hatching became a highly specialized phase of poultry husbandry. No longer is it practicable for a farmer with 100 or more hens to hatch chicks; a hatchery does it much more cheaply and a better quality of bird is secured. By 1937 there were 673 commercial hatcheries in the State with an estimated total capacity of 14,500,000 eggs. More than two-thirds of all the chicks reared that year were custom-hatched. One plant had a capacity of 500,000 eggs; 342 had a capacity of 10,000 to 54,000 eggs. Millions of custom-hatched day-old chicks are packed in ventilated cartons and delivered by parcel post, express, or air mail. They reach any destination within sixty or seventy hours of travel in perfect condition. In 1928 the Pennsylvania Baby Chick Association, representing a production of nearly 3,000,000 chicks, was organized; in 1933 it was merged with the State Poultry Association. The first baby chick show in the State was held at Honesdale, Susquehanna County, April 2-3, 1930; it was sponsored by the Wayne County Poultry Association.

In 1925 the "Accredited Hatchery Plan" was inaugurated by the Pennsylvania Department of Agriculture. Its primary purpose was to establish standards of quality for baby chicks, and especially to reduce loss from bacillary white diarrhea, a very serious chick disease which may be transmitted through the egg. Flocks were accredited when all breeding birds had been inspected for health, vigor, type, and production, and were free from bacillary white diarrhea and other transmissable diseases in two consecutive inspections. On January 1, 1934, Congress enacted a Hatchery Code which established fair trade practices and defined the proper use of such terms as "accredited," "certified," and "blood-tested." By 1930 electric brooders were standard equipment.

The rapid development of the poultry industry as a specialized farm enterprise brought about the concentration of large numbers of chickens in small areas. No longer was it practicable to permit them to range at will. This resulted in a marked increase in mortality from such diseases as range paralysis and coccidiosis, and from such parasites as tape and round worms. Since many diseases and parasites are transmitted through the droppings and infected ground, their spread through the flock was likely to be rapid. A flock mortality of thirty to forty per cent was not uncommon.

This grave situation gave rise, about 1920, to the confinement method of poultry production. Birds were kept confined in small groups to houses which had a sun porch with a heavy galvanized wire mesh raised floor, so that their feet were not in contact with the feces; or they were confined in individual wire cages. The confinement method greatly reduced loss from diseases and parasites and did not reduce egg production materially, if at all. By 1934 many poultrymen had built poultry apartment houses of one to four floors holding several thousand laying hens. The extreme example of the confinement method—individual cages or hen batteries—found favor under certain conditions, especially in urban areas. In 1937 the State Poultry Association reported, "The number of hen batteries is increasing steadily. The soundness of the battery method has been proved beyond question in broiler-production and egg-production plants. Today there are enormous broiler plants where the birds never set foot on the floor from the time they are brought in as baby chicks until they are sent to the killing room. There are egg factories, often several stories high, in which thousands of eggs are produced daily by caged layers."[25] Most poultrymen agree, however, that if sufficient uncontaminated land for rotation ranges is available, it is better to let young stock, at least, run on it.

Artificial illumination of poultry houses by electric light during the short and cloudy days of late fall and winter began to be practiced about 1920. This stimulates the sexual development of fowls and results in somewhat earlier and heavier egg production of pullets. "Not only was constant 24-hours per day illumination of no value . . . but . . . its application prior to approximate sexual maturity was detrimental. The best time for the application of supplementary illumination," concluded the Pennsylvania Agricultural Experiment Station, "during a time of decreasing daylight is when pullets are of an age usual for first egg production."[26]

The most important development in feeding practice after 1900 was the addition of vitamin D supplement to the ration, especially in winter, usually in the form of cod liver oil or fish oil. This is a practicable substitute for summer sunshine. By 1930 it was possible for poultrymen to raise pullets at any season of the year; this helped to equalize the seasonal production of eggs. In the World War I period the extremely high cost of proprietary poultry feeds—up to $100 a ton—led many poultrymen to replace some of the costly animal protein with cheaper vegetable protein in the form of alfalfa meal. Large quantities of this material were imported from the West; but soon the demand was met, in part, by the extensive alfalfa acreage and dehydrating plants of Northampton County. A few years later soy bean oil meal served the same purpose.

Marked progress has been made in the control of poultry disease. In 1896 Leonard Pearson, State Veterinarian, estimated, "One-tenth of the poultry [of Pennsylvania], young and old, is carried away by disease each year."[27] By 1926 the average flock mortality was nearer thirty per cent than ten per cent. Even after control measures had been more generally adopted, the Pennsylvania Agricultural Experiment Station found, "Mortality figures reported by farm flock owners . . . for the years 1934, 1935 and 1936 averaged 18.3 per cent."[28]

The fundamentals of disease control are chicks bred for disease resistance, sanitation, and good management. By 1935 breeding for disease resistance had begun to yield useful results. In 1939 the Pennsylvania Agricultural Experiment Station reported, "The selection of breeders for viability of family, with secondary consideration given to egg production, egg size, sexual maturity and body weight, is entirely practicable. . . . Increase in viability can be obtained without significant losses in any of [these] characters."[29] The Poultry Standardization Program of the Pennsylvania Department of Agriculture has helped to reduce flock mortality through required periodic blood tests for pellorum disease and culling for health and vigor.

Loss of birds by theft was very heavy after 1920, especially in southeastern counties, in spite of the vigilance of State Police. Urban thieves operated in a network of gangs and had many "fences" to handle stolen birds. In 1927 the poultrymen of Chester and Delaware counties and of the state of Delaware organized the Interstate Poultrymen's Protective Association. A detective was employed and substantial rewards offered; a marked reduction in thefts resulted. Tattooing birds to identify them in case of theft was begun in 1932. The owner's brand was recorded with the Pennsylvania Department of Agriculture, the State Police, and the county sheriff. This helped to minimize chicken stealing.

MARKETING EGGS

Probably no other farm enterprise shows such a wide range of profit and loss. This is due as much to the large number of poultrymen who are inexperienced as to the natural hazards of the business. The relatively small amount of capital required to get a start with poultry tempts many to undertake it who should not do so.

In 1928 Pennsylvania produced only about seven per cent of the eggs consumed in the State; in 1940, about seventy per cent. Prior to 1930 large quantities of eggs were shipped into the State from the Pacific coast, particularly from California. This competition has dwindled, but the midwestern states, particularly Illinois, Minnesota, and Indiana, continue to compete in Pennsylvania markets. Because of nearness to market, Pennsylvania poultrymen usually enjoy a price advantage of about fifteen per cent above the average for the United States. This advantage may be largely offset by higher costs of feed and labor. The annual per capita consumption of eggs has more than doubled since 1880, from ninety to over 200 in 1940.

Until quite recently, quality in eggs was a very elusive character. On March 11, 1909, the General Assembly passed an Act to prevent the sale of rotten eggs. The State Dairy and Food Commissioners that year reported, "the horrible condition of affairs found to exist in Philadelphia. . . . Certain unscrupulous persons were in the habit of gathering up putrid eggs and selling them to bakers who used them in the manufacture of cakes. . . . Some of these eggs were in the last stages of putrefaction . . . [and were] a very serious menace to health."[30] On July 10, 1909, the Legislature enacted a law requiring that eggs sold as "fresh" or under any other term implying fresh must meet the minimum requirements of that grade. Until then Pennsylvania had been the dumping ground for the ancient eggs of other states.

Prior to July, 1931, each large city had its own grade names and terms; not until then were United States Standard grades established in this State. Eggs are sold by the dozen in Pennsylvania instead of by the pound, as in some western states, but with a price differental based on size or weight. Although many consumers are prejudiced in favor of eggs with a brown shell, as being "richer," fully ninety per cent of the eggs produced in Pennsylvania in 1940 were white.

To meet the competition of western graded eggs, cooperative marketing associations controlled by poultrymen, commonly known as egg auctions, were established. The first auction was opened at Doylestown, Bucks County, on July 13, 1931, which was the year that standard grades were promulgated in this State. Similar enterprises were organized during the next few years at Center Point, Coatesville, Bethlehem, and Butler. By 1940 there were eight independent egg marketing cooperatives, five of which were auctions. Most of these came into existence between 1931 and 1935, when egg prices were very low and graded western eggs commanded a premium on eastern markets over ungraded Pennsylvania eggs. The auctions received eggs from members throughout the week, inspected and graded them. Commonly two auctions were held each week. During the fiscal year 1938-1939, the eight cooperative marketing organizations sold eggs to the value of $2,844,000 and dressed poultry to the value of $254,000. In 1933 prices secured by egg auctions exceeded New York City prices by 3.5 cents a dozen. In 1936 the Pennsylvania Agricultural Experiment Station reported, "The Butler Egg Auction has improved the local prices of eggs by establishing recognized grading standards for size and quality. It has widened the market area so that all high quality eggs in the area command a ready sale."[31] Although numerous personal retail outlets for eggs have been developed by poultrymen, most of the production goes to market through wholesale channels—country egg collectors, commission men, cooperative shipping associations, and auctions.

The cost of producing eggs is influenced, among many other factors, by the size of the flock. In a study of 450 representative flocks extending over a period of twenty-five years, beginning in 1922, it was found, "There is a definite relation between the size of flocks and profits. As the number of birds in the flock increased profits increased also. As size of flock increased labor was used more effectively." The net annual profit per hen from flocks of less than 100 was fifty cents; from flocks of 400 to 700 it was ninety cents; from flocks of 1,000 or more it was $1.38. Similarly, "higher rates of production tend to be associated with larger flocks, greater profits per hen." The annual return from hens that produced less than 120 eggs a year was minus twenty-four cents; from hens that produced 140 to 160 eggs a year, fifty-seven cents; from hens that produced 200 or more eggs a year, $1.80.[32]

The higher profit a hen derived from large flocks, on the average, is due in part to economy in the use of labor. About one-sixth of the total cost of producing eggs is labor. Flocks of 100 or fewer hens require 2.6 hours of labor a hen, while only 1.6 hours are required in flocks of over 700. Large flocks also permit greater efficiency in housing, feeding, and other management practices. Notwithstanding the economic advantages of large flocks, under good management, most of the eggs produced in Pennsylvania are from flocks of 100 to 500. Flocks of this size fit in well with dairy farming.

The fortunes of poultrymen have fluctuated fully as widely as those of producers of other farm commodities. During the period from 1900 to 1940, eggs sold at different times for twelve cents a dozen and for seventy-five cents a dozen. According to an agricultural economist, "Cost . . . studies over a long period of years . . . show that when eggs do not average more than 21 cents per dozen for the year, a hen must produce 165 eggs a year before she makes a profit."[33] In general, the poultry industry operates in cycles of about four years, three of increasing prosperity followed by a year of lower prices. This trend often is changed by economic conditions.

Like other phases of Pennsylvania agriculture, the poultry industry experienced a brief "boom and bust" period during and after World War I. In 1914 and 1915, prices went sky high. Eggs brought sixty to seventy-five cents a dozen, broilers eighteen to twenty-eight cents a pound. Egg boycotts were organized by aroused city housewives. Poultrymen were pictured in metropolitan newspapers as greedy war profiteers. The truth was that the cost of producing eggs was abnormally high because of the very high cost of feed and labor. The poultry industry was depressed rather than stimulated by war-time conditions. The United States Food Administration urged "meatless days" and advised people to eat more eggs and poultry meat, and to save pork, beef, and lamb, since poultry could be brought to maturity more quickly than any other livestock. But grain and labor was so high that many poultrymen had to reduce their flocks. In August, 1917, it was estimated that there were two million fewer chickens in the State than there were a year before.

In an effort to cope with this situation the Federal government established "The Pennsylvania War Poultry Commission." This was powerless to change the current of the times. In 1918 the Pennsylvania Department of Agriculture referred to "the terriffic slaughter [of poultry] that has been going on: to the flood of poultry that has gone on the market . . . the last six months. This has taken from twenty-five to thirty-three per cent. of our laying hens and . . . bids fair to reach fifty per cent. reduction before the end of the year. . . . [The primary reason is] *that the money received for eggs will no longer pay the feed.* Roughly, . . . eggs have brought producer 20 to 25 per cent. advance over the prices of a year ago and feed has cost, 75 to 125 per cent. advance. . . . The biggest reduction . . . has been among the village, town and city people. . . . Farmers have more generally reduced the size of their flocks than quit poultry altogether. Poultry farmers or owners of poultry farms . . . have stuck to the business so far."[34]

In a misguided effort to stimulate back-yard poultry production during the war, the United States Department of Agriculture gave away 40,000 eggs in settings of thirteen for hatching. The results were negligible and in some cases ridiculous.

Poultrymen participated in the brief but feverish post-war prosperity; in 1920 eggs brought seventy-two cents a dozen and broilers twenty-seven cents a pound. Then came the "Great Depression." The lowest point in twenty-five years was reached in January, 1933, when strictly fresh eggs sold in Pittsburgh for thirteen cents a dozen.

POULTRY MEAT

The production of chickens specifically for meat, not as a by-product of egg production, is an increasingly important aspect of the poultry industry. Chickens for meat are of three commercial classes—"broilers," eight to twelve weeks old and weighing about two and a half pounds; "fryers," thirteen to eighteen weeks old and weighing two and a half to three and a half pounds; "roasters," up to nine months old and weighing over three and a half pounds. The production of broilers expanded rapidly after 1920; until then they had been mostly cockerels culled out in the rearing of pullet replacements for the laying flock, and were sold in early summer. Thereafter they were reared the year around. After 1930 there was a tremendous increase in the production of broilers for the retail cut-up-poultry trade. Cabel Grimes of Fredericksburg, Lebanon County, was a pioneer in this enterprise; in 1940 he produced about two million broilers for this purpose. Pennsylvania, however, still does not meet the demands of the markets of the State for poultry products. In 1926 Pennsylvania poultrymen supplied only three per cent of the dressed poultry marketed in Philadelphia.[35]

One of the most remarkable developments in the poultry industry was the revolution in turkey production after 1920. Between 1910 and 1920 the number of turkeys in the State declined forty per cent. In 1916 it was asserted, "Turkeys have practically disappeared from Pennsylvania as a dependable market crop . . . the great bulk of turkeys sold in this year's holiday markets were shipped in."[36]

The method of one turkey raiser was thus described, in 1912: "[The turkey] seems to be like the Indian—it craves freedom and languishes in confinement. . . . The turkey does not want to be 'managed'; it needs to be let alone. This man lets his turkeys take care of themselves almost wholly. He sends one of the children occasionally to take note of their number and their wanderings, and, perhaps, throw them a handful of grain. . . . I have often seen one of the old hens and her brood a half mile from home, chasing grasshoppers and bugs. . . . Insects, worms, seeds and 'green fodder' are far better for young turkeys than any of the artificial substances the poultryman can prepare."[37]

The upsurge in the chicken business about 1920 was accompanied by a revival of interest in turkey production. Custom incubation of eggs laid by trap-nested birds made it possible for farmers to purchase pedigree poults and to rear them in brooder houses. Being thus kept away from adult birds, there was less loss from diseases and parasites than under natural rearing. It was discovered, also, that turkeys could be reared successfully on restricted range, if rotated, or even when confined to brooder houses with a raised wire mesh floor on the sunporch. The level of protein in the turkey ration was increased, and minerals and vitamin supplements added. Most of these improved methods resulted from research by the Pennsylvania Agricultural Experiment Station.

The result was an immediate and pronounced increase in turkey production. In 1920 there were only 150,000 in the State; in 1940 more than 500,000. By 1944 the number was 1,250,000. It was an amazing development within so brief a period. Turkey production is a highly specialized phase of poultry husbandry; in 1940 turkeys were raised on only five per cent of the farms.

Agricultural illumination has been used with success in turkey production. Let the Pennsylvania Agricultural Experiment Station tell the story: "Normally, hen turkeys lay eggs only during the long days of early spring. Evidently the extended influence of visible light rays on certain glands stimulate egg production. This habit was of no importance until turkeys began to be in demand as a table fowl the year around. Then it became necessary to have eggs for hatching as early in the winter as possible. By turning the light on in his turkey pens at 4 a.m. beginning in early December, Mr. Margolf has had good success in producing fertile turkey eggs by February 1. . . . Turkey hens will begin to lay about three weeks after first being subjected to the lighting process."[38] Turkeys placed under artificial illumination after the middle of January begin to lay fertile eggs at least two months before the normal season; so marketable turkeys can be produced in late summer and early fall.

Chickens and turkeys comprise practically all of Pennsylvania poultry. Geese, which were highly valued in early days when their feathers were in great demand, have almost disappeared. In 1940 ducks were kept on nine per cent of the farms, but usually in small numbers. There are a few duck specialists. In 1940 Brubaker Brothers of Lancaster County produced 125,000 ducks, most of which were sold in New York City when three or four pounds in dressed and drawn weight.

From 1840 until 1860, the irridescent blue and green plumage of the peacock was a familiar sight on the farms of southeastern Pennsylvania; they were about as sparingly distributed as the guinea hen is now. Like the yellow-billed cuckoo, or "rain crow," the peacock was regarded as an almost infallible prophet of rain. The Pennsylvania Germans had a saying, "Wann der po-hahne greischt gebts raya" (When the peacock cries, it is going to rain). After 1860 few farmers kept peacocks, but the birds continued to adorn parks and gentlemen's estates.

CHESTER COUNTY BEEF

In 1913 E. S. Bayard, editor of *National Stockman and Farmer,* grew lyrical about his favorite livestock: "[The steer] converts into money roughage otherwise wasted or unmarketable. . . . He turns the grain heap, the hay stack, the straw pile and the pasture into money and manure. Most diseases pass him by. . . . He is . . . always convertible into cash regardless of age, size, condition and breeding. . . . He leaves the fertility on the farm when he carries himself to market. . . . The richest nations are those who grow cattle and eat beef; the richest agricultural states are those which raise or fatten steers; and the richest agricultural county in this country [Lancaster County, Pennsylvania] feeds the most steers."[39] All of which is true; nevertheless the inexorable laws of economics have made the dairy cow, not the steer, the mainstay of Pennsylvania agriculture.

It was not always so. Between 1830 and 1870 the steer vied with the dairy cow for supremacy. Chester County was the fat-cattle capital of the nation. Thousands of beeves were fattened each year on its justly celebrated bluegrass and white clover pastures, twenty to forty to a farm. Said the editor of *Farmers' Cabinet* in 1841, "On Tuesday last, I paid a visit to several of the farms upon the far-famed Brandywine hills of Westchester. If, Nebuchadnezzar-like, I am ever 'turned out to grass,' may it be upon such fat pastures as I saw there . . . This I find is a common practice, to drive lean oxen from Ohio to take on a coat of Pennsylvania fat; and from this source comes the fine juicy beef with which your fine [Philadelphia] market houses abound. Many of these same cattle are driven into Ohio while quite young from still further West. . . ."[40] In 1846 another agricultural editor commented, "The eastern part of Pennsylvania is becoming every year more and more engaged in the grazing business but little attention is paid to raising cattle, the graziers depending almost altogether for a supply of beef cattle from Ohio, N. York, & other states. . . . The number fattened annually in this [Chester] county is between forty and fifty thousand head. Lancaster, York and Dauphin are fast following the example of Chester."[41] At that time the beef cattle industry had profited by the decline of distilleries in southeastern Pennsylvania, which made large amounts of grain available for feeding to livestock that formerly had been used in making whiskey.

In 1847 the farmers of Chester and Delaware counties petitioned the Legislature to pass a law authorizing the Governor to appoint an "Inspector of cattle intended for the Philadelphia market, whose duty it shall be to examine the same, and distinguish between such as are fit for the knife and those that are not. It is said the business of the grazier and fair dealer is greatly injured by the slaughtering . . . of cattle entirely unfit for the table."[42] The industry was so profitable that it spread to Lebanon, Cumberland, and Berks counties. We learn from the Philadelphia *Inquirer* of August 15, 1849, "Large farm tracts, totalling several thousand acres, in Berks and Chester counties are being purchased by a group of mid-west cattle dealers who plan to use the acreage to fatten steers close to eastern slaughtering centers. It was explained that cattle now fattened in the mid-west lose weight when shipped East, so it is only good business to send them when they are lean to a good grazing point near the market centers and let them gain weight there." Most of these cattle were fattened on pasture alone but there was some supplemental grain feeding.

Chester County beef commanded a premium price. In 1854 the editor of *Pennsylvania Farm Journal* commented, with pardonable pride, "At the yards of both New York and Philadelphia, any week of the year, it will be observed Chester county fed beef always rates a little higher per 100 lbs. than that from any other quarter, and it is a common remark that the tenderest and most juicy ribs and sirloins which grace the tables of the good livers in these cities, are from Chester county."[43] He attributed this to "the unrivalled quality of the pastures; the Green Grass, *Poa pratensis* (Kentucky blue-grass) grows naturally on our soils and makes the strongest pastures. The largest part of our grazing farms is retained in this grass for periods of ten to thirty years. . . . Our farmers generally avoid stocking too heavy so that cattle have sufficient food even in dry seasons and in ordinary seasons great abundance."

Most of the steers fattened in the southeastern counties came from northern and western Pennsylvania, Virginia, Ohio, Indiana, Illinois, and even from beyond the Mississippi. Lean two- or three-year-old cattle from the prairie states were driven across the Alleghenies in the fall by professional drovers, kept on a maintenance ration during the winter, and sold as fat cattle at the end of a summer on pasture, having put on from 200 to 300 pounds. Occasionally they were kept on a fattening ration during the following winter and sold whenever the market was propitious. Stockmen who lived near the city had a decided advantage; they could drive their cattle to market in a short time, thus availing themselves of a sudden rise in price.

After 1850 the Chester County beef industry began to wane; by 1870 it was but a fraction of its former importance. In 1852 Philadelphia received 49,418 tons of cattle over the Pennsylvania Railroad, of which 32,552 tons came from west of Pittsburgh.[44] The trickle from the West became a stream. The economics of the situation were against Chester County stockmen. Western beeves were fattened on land which cost, perhaps, only a dollar an acre; good pasture land in southeastern Pennsylvania cost $30 to $100 an acre. In the West, corn was worth twenty-five to thirty cents a bushel; in Pennsylvania, at least twice that much. Even the high cost of transportation from the West could not offset these handicaps. By 1859 the Chicago packing industry was well established; that year it slaughtered and shipped East 51,606 cattle.[45]

The beginning of shipment of dressed western beef to eastern markets in refrigerator cars, in 1868, hastened the downfall of the Chester County beef industry. Even as early as 1853 the editor of *Pennsylvania Farm Journal* cautioned, "Already, fat cattle, . . . from Indiana and Ohio . . ., are brought down [to Philadelphia] in cars built for the purpose. . . . Recently thirty-five car loads of live hogs arrived in Philadelphia from the West. . . . Our farmers, particularly in Eastern Pennsylvania, should . . . devote *more* attention than hitherto to certain perishable articles, which do not so well bear long carriage, such as fruits, vegetables, dairy products, butter, milk, Poultry, &c. We believe these to be far more profitable now, than fattening cattle or raising grain."[46] He was a good prophet.

LANCASTER COUNTY BEEF

With constantly increasing competition from the West the number of cattle fattened in Chester County declined sharply, but the industry continued to be an important farm enterprise in southeastern Pennsylvania. After 1870 preeminence in fat cattle production passed from Chester to Lancaster County. Other southeastern counties, particularly Cumberland, Berks, York, and Lebanon, participated in the industry to a considerable extent. Fewer beeves were fattened on pasture, more by winter feeding. In 1879 Frederick Watts of Cumberland County described the prevailing practice in the Cumberland Valley: "[Stock] is brought from the West, purchased in the fall, fed with hay, corn, and oats during the winter, and sold in the months of March, April, and May. The farmer finds that the increase of weight and price of cattle fed is the most profitable mode of disposing of his corn and oats and increasing the quality and quantity of his manure."[47]

The economics of the enterprise were detailed in *Farmers' Friend* for 1877: "Most of the progressive farmers of the Cumberland Valley feed cattle during the winter, not with a view to making money directly on the cattle but for the purpose of increasing the quality and quantity of the manure pile. They buy stockers weighing from 700 to 1,000 pounds in September or October, turn them out to grass for a few weeks, then stable and feed them for three to six months. The average increase in weight, if well fed, is about fifty pounds per month. The average increase in value of the beef is about $1.50 per hundred. The result of six months of feeding is about this: The average cost of a steer weighing 800 pounds during the past seven seasons has been about $4.00 per hundred or $32 each. The selling price when fat has been about $5.50 per hundred. The increased weight of 300 pounds makes the value when fat $60.50. This pays well for his labor."[48] This statement, with price changes to suit the times, might serve to describe present practice.

The preeminence of Lancaster County in beef production after 1870 is indicated in a statement by Johnson Miller of Lititz, in 1889, that according to the census of 1880 there were 4,500 farms in Lancaster County of less than fifty acres which were feeding an average of five head of cattle; 2,460 farms of less than 100 acres which were feeding an average of eight head; and 2,000 farms of over 100 acres which were feeding an average of ten head. In round numbers, 65,000 head of cattle were fed in the county, of which 50,000 were shipped to eastern markets. He said few Lancaster County farmers did more than come out even, since they were in competition with the West, where corn was cheap and freight rates low. Fat western cattle were shipped 1,000 miles to Philadelphia for about $48 a head, while Lancaster County farmers paid $20 a head for shipping them sixty miles in the same cars.[49]

Beginning about 1890, there was a decided recession in cattle feeding in Lancaster County; by 1900 the number had dropped to about 20,000 a year. This was the low point. In 1902 the State Board of Agriculture adopted this resolution:

"Whereas, In the readjustment of conditions governing beef production, it may again become possible for the Pennsylvania farmer to compete in this field. . . . Resolved, That we approve of the effort now being made by the Philadelphia Live Stock Association to encourage the production and use of Pennsylvania fed cattle."[50] Agitation against the "beef trust" about 1906 resulted in greater demand for home-dressed beef.

About 1908 there was a definite revival of interest in the production of fat cattle. By 1912 Lancaster County again fed 40,000 to 60,000 steers a year. The Lancaster County Stock Yards became the beef-cattle center of the East. Each year about 4,000 carloads, or 120,000 cattle, were handled there. Around forty per cent of these were fed on Lancaster County farms and the remainder in Chester, York, Berks, Lebanon, and Cumberland counties. Most of the steers were bought in September, October, and November and sold in April, May, and

June. A few were fed lightly during the winter, turned out to grass in the spring, and sold as grass-fat cattle in the fall. At the 1907 International Livestock Exposition in Chicago, a Pennsylvania-fed steer won the much-coveted distinction of being judged Grand Champion of the show, for the first time in history. He was "Squire Good," fed by C. L. Taggart of Washington County; he weighed 1,150 pounds.[51]

The revival of interest in beef cattle was stimulated by the high price of beef about 1914. Other parts of the State began to produce more beef. The famous bluegrass pastures of Greene and Washington counties, in particular, turned off many excellent grass-fat cattle. Western steers were bought in the fall, wintered over on a maintenance ration of hay and silage, and turned out on the magnificent pastures of that section in the spring. By fall they had gained 250 or more pounds on grass alone; sometimes there was a little supplemental feeding of corn. Said W. H. Tomhave, in 1914, "Grass is the cheapest form of feed that we can get. . . . Grass cattle have come to the Pittsburgh market from southwestern Pennsylvania in the fall of the year equal to the short grain fed cattle from Ohio and other states."[52] Probably the largest number of steers ever fed in the State by one farmer was in 1917: A Lawrence County farmer fed 250 western steers this year. They averaged 400 pounds when bought and cost eight and three-quarters cents a pound. He fed them to 850 pounds and sold them for thirteen cents a pound.[53] In 1923 the Producers' Livestock Cooperative Association was organized at Pittsburgh to facilitate the purchase of feeders, stockers, and other livestock by western Pennsylvania farmers.

After 1920 fewer steers were fed in Lancaster County. In 1930 only 800 of the 6,800 farms had fat cattle to sell; and the total for the county was about 20,000, or one-third of the total production of the State. The major cash crop of Lancaster County is tobacco. The association of steer feeding with tobacco production is mutually advantageous, especially in the most efficient use of labor and the maintenance of soil fertility. Cigar-filler tobacco benefits by heavy applications of manure. By purchasing feeders in the fall and fattening them during the winter, farmers can devote nearly all their high-priced land to crop production. The annual Lancaster County Fat Cattle Show is a notable event. Usually upward of 2,500 head are on exhibition, most of which were bought as feeders through the Lancaster Stock Yards and fed in that county.

SHIFTS IN THE BEEF CATTLE INDUSTRY

Until about 1840 most farmers preferred "natives" for fattening. These were a nondescript mixture of many breeds, with Devon blood predominating. At that time the dual-purpose type of cattle was considered most profitable. In 1846 Thomas H. Burrowes expressed the prevailing opinion of his day: "It is not by any means certain, that the full-blood of any of these imported breeds is suitable to our climate, which is much more severe than they have been accustomed to. Unless they receive better food, and greater care than the native animals require, they do not seem to thrive."[54]

From 1850 to 1900 Shorthorns dominated the beef industry of the State. This breed was imported from Europe in 1816, but few came until after 1834. In that year the Ohio Company for Importing English Cattle was organized; it give a marked impetus to the breeding and importation of Shorthorns and their sub-breed, the Durham. In 1854 the State Agricultural Society reported, "The judgement of the present day is decidedly in favor of the Durhams [the familiar name of the Short-Horns]. The Herefords, as grazing cattle, take the next rank . . . though but little known in this country. . . . In size and early maturing [North Devons] fall short of either the Herefords or Durhams."[55]

Herefords were imported into Kentucky in 1817, but not until after 1840 did many come into Pennsylvania. After the Civil War this breed dominated the western range country, but Shorthorns continued to rule in Pennsylvania until 1900. In recent years "white-faced cattle" have become popular, particularly for a short feeding period. The first importation of Aberdeen-Angus was in 1873. Since 1900 this breed gained steadily in favor, particularly in the production of baby beef.

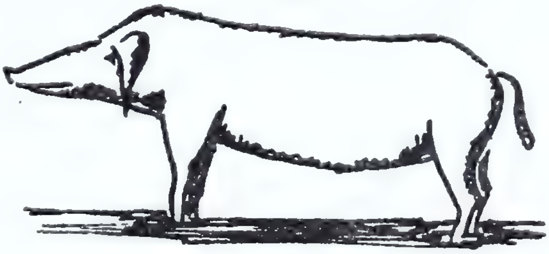
The most important shift in the feeding of beef cattle was the use of corn silage, beginning about 1912, largely as a result of experiments at The Pennsylvania State College.[56] Previously practically every ration for fattening steers consisted of clover or mixed hay as roughage and corn and cob meal, bran, or oats as concentrates. The substitution of corn silage for part of the roughage and grain lowered the cost o grain.

Until after 1900 little attention was given to early maturity o beeves. Most cattle were slaughtered at three or four years old o older. Large size, rather than low cost per pound of gain, obsessed many feeders, particularly gentlemen farmers who sought to develop mammoth animals regardless of cost. This was in the days when oxe were work animals and were fattened after they had become too age for efficient use on the farm. It is recorded that an ox fed by J. Sheet of Berks County was slaughtered in 1841 when eight years old; it live weight was 3,350 pounds, the dressed weight 2,388 pounds.[57] Ac cording to *Pennsylvania Farm Journal* for 1853, "A mammoth stee raised by Mr. John Brillinger, in Manchester township, York county passed through this place [Columbia, Lancaster County] on Monda last. He is only four years old, and weighs 3480 pounds."[58] In 186 the *Lycoming Daily Gazette* reported, "PATRICK McFADDEN'S OX, Which weighs upwards of 4,000 pounds, will be on exhibition [at Williamsport] . . . this week."[59] These monstrous animals served no useful purpose.

After 1900 it became more generally known that the law of diminishing returns operates in cattle feeding; that as the fattening period is prolonged the cost of each pound of gain increases. With some animals it costs several times as much to produce a pound of meat at the end as in the beginning of the fattening period. With this in view, "baby beeves" began to appear on the market about 1905. These weighed 900 to 1,200 pounds when twelve to twenty months only. By 1925 a large number were marketed which weighed 900 to 1,000 pounds when one year old. The Thousand Pound Calf Club, which was sponsored by the several beef cattle breed associations of Pennsylvania, awarded gold medals to those who produced a steer weighing 1,000 pounds at one year of age. Consumers prefer baby beeves, and growers can produce them more cheaply; nevertheless a large proportion of the fat cattle in the State continue to be marketed when two or three years old.

SWINE

Since the generations of swine are close together, the numbers may fluctuate sharply from year to year. The maximum number of swine in Pennsylvania was reached in 1840, where there were 1,504,000. These were generally distributed throughout the State with the greatest concentration in the southeastern counties. At that time many pigs, especially those west of the Susquehanna, still roamed the fields and forests in search of a precarious living on roots, herbage, and grain in stubble fields. In the autumn, however, they fared sumptuously on mast and on dropped apples, particularly sweet varieties. Many residents of villages and towns kept swine which had at least as good right on the streets as citizens. Swine confined to the barnyard were fed "slop" from the table and dairy, sometimes supplemented by boiled potatoes, until within four to six weeks of slaughtering, when they were fed liberal amounts of whole corn.[60] The long-legged, long-snouted



Razor-back hog, 1840

razor-back hog of colonial days still persisted in the back counties, but most swine were grades of improved breeds.

After 1850 swine production declined heavily, primarily because pork could be produced much more cheaply in the prairie states. It was commonly estimated that it cost six cents to produce a pound of pork in Pennsylvania, two cents in the West. After 1868 the use of the refrigerator car to ship dressed pork to eastern markets still further depressed commercial production in this State. Cincinnati became the pork-packing capital of the nation, but soon relinquished this leadership to Chicago. Swine production quickly reacts to price changes and in response to sudden demands, as during war time; normally it tends to fall into a vicious cycle of over- and underproduction, o about four years. In 1918 the largest crop of pigs ever marketed in this or any other country crowded the stock yards.

The rapid rise of dairying in the southeastern counties after 1870 was accompanied, at first, by a corresponding increase in the number of swine, which were fed skimmed milk and buttermilk. It was commonly estimated that one hog could be kept for every four cows. Corn was the universal hog-fattening feed; those counties in which corn was produced in greatest amount, as Lancaster, York, Berks, Franklin, Lebanon, and Cumberland, also led in swine production. This spurt was short lived; western competition soon impinged upon the industry even more severely.

The advent of creameries, about 1880, was a set-back to swine husbandry. It was not convenient for farmers to feed hogs when the skimmed milk had to be hauled back from the creamery. Some creameries kept swine. After 1900 the rapidly growing demand for market milk still further handicapped swine production, since pig cannot be raised as economically when whole milk is sold away from the farm. In 1914 the Pennsylvania Department of Agriculture stated "The past few years have seen a great change in the dairy busines of this State—that is, instead of producing butter and cheese, w furnish now much more largely whole milk for city consumption. . . On the farm, instead of the raising of pigs and young cattle, you fin only cows."[61]

After the very high pork prices of the World War I period, th bottom dropped out of the market; by 1925 the number of swine ha declined to 600,000. In 1940 there were 754,000; the leading countie were York, 50,910; Lancaster, 36,870; Berks, 32,090; Franklin, 29,960.[6 In these prominent corn-raising counties hogs were raised commercially but in most parts of the State they were grown for home use only commonly three to five on a farm, with perhaps some surplus of dresse pork to sell locally. Even in Lancaster County, many farmers wer buying fat hogs to slaughter for home use. Dairy farmers, in pa ticular, were less inclined to keep swine because of sanitary conditions that must be maintained in and near dairy barns.

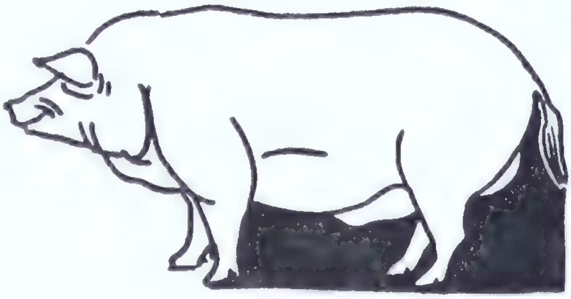
By 1860 the colonial razor-back or "land pike" hog, which still survives in some of the southern states, had largely disappeared. Crosses of English breeds, especially Berkshire, Suffolk, and Duchess, were becoming fairly common, since it was inexpensive to upgrade native swine with purebred boars. Berkshires were first imported in 1823. "Berkshire fever" raged with great virulence from 1838 to 1841. Five hundred dollars was paid for a single animal. The collapse of this inflationary period was followed, as usual, by unjustified prejudice against the breed.

After 1845 Chester White became popular throughout the State. According to farm journals of the time, this breed was originated about 1820 by James Jefferis, a retired sea captain of West Chester. A boar purchased from Medfordshire, England, reputedly of stock developed by the Duke of Bedford, was bred to native stock.[63] At first this hog was considered "not a breed to itself but a mixed breed";[64] but it soon became recognized as distinct. It did not attract more than local interest until after 1848, when it was exhibited at many fairs and was christened Chester White; previously it had been known as "the Chester and Delaware hog." In 1856 the State Agricultural Society reported, "The 'Chester breed of hogs' have a wide-spread reputation, and large numbers have been exported from our county [Chester] to improve the stock in distant parts of the country."[65] Very few swine of the bacon breeds have been kept in this State. In recent years stockmen have found that a cross between two purebreds gives pigs that make the most economical gains. Beginning about 1918, the up-grading of swine was promoted by the organization of numerous community cooperative swine breeders associations.

As in the fattening of beeves, the trend of market demand since 1900 has been toward smaller hogs. At that time the market preference was for hogs of high dressing percentage, weighing 180 to 225 pounds live weight; previously a 400-pound hog, or larger, had been preferred. Great size had been considered a mark of superiority and monstrous animals were noted in country papers. In 1869 the *Lycoming Gazette and Bulletin* recorded, "Cranfin and Casner killed a hog weighing 614 pounds."[66] In 1924 a Poland China barrow was exhibited which weighed 1,202 pounds on foot when twenty-eight months old. It created a sensation. Such over-stuffed animals were wholly impracticable; younger stock could be fattened much more economically. Most hogs now are butchered at six to eight months old and weighing about 200 pounds; smaller hogs, weighing 140 to 175 pounds, top the market; these can be turned off at five to six months.

The Keystone Ton Litter Club was organized by the Agricultural Extension in 1924. Gold medals were awarded by the respective State breed associations to those who raised a single litter of pigs which weighed 2,000 pounds or over, in the aggregate, when 180 days old. In 1924 fifty-eight men qualified for this award. By 1929 the watch chains of 407 farmers were adorned with the coveted medals.

Some litters weighing much more than a ton at six months have been reared. In 1939 H. W. and Paul Lecrone of Huntingdon County had a sow that farrowed twenty pigs, of which eighteen were reared. They weighed 4,159 pounds when 180 days old.[67] In 1922 an Indiana County farmer had a Chester White sow which produced 4,560 pounds of dressed pork in one year. She farrowed a fall litter of fifteen pigs, ten of which dressed out 2,190 pounds of pork at 180 days; and a spring litter of twelve pigs which dressed out 2,875 pounds of pork at six months.[68] Apparently the fecundity of swine knows no limits. What is believed to have been a world's record was established at the National Farm School, near Doylestown, Bucks County, April 22, 1930. A sow that had farrowed a litter of fifteen cross-bred Duroc and Berkshire pigs on April 14 farrowed another litter of thirteen Berkshire pigs six days later.[69]



A prize-winning Tamworth bacon hog

Prior to 1920, most pigs were fattened in dry lots; thereafter, green forage crops, as alfalfa, clover, and rape, supplemented with grain, gave faster and cheaper gains. Beginning about 1905, immunization of swine against hog cholera by vaccinating them with serum brought relief to the industry. Previously, periodic outbreaks of this highly infectious and mortal disease had caused heavy loss; in 1897 the loss was estimated at $400,000, and ninety to 100 per cent of the animals in infected herds died. Vaccination and sanitary measures have reduced the loss to less than one per cent.

Most of the swine now reared in Pennsylvania are dressed on the farm for home use or for local sale. In 1923 it was reported, "The average of pork consumed per farm . . . is 689 lbs. . . . The rural population alone consumes annually 224,000,000 lbs. of pork which is approximately 64,000,000 lbs. more than is produced in the State."[70] Pork is the dominant meat of rural people because swine are more prolific than other meat animals, the capital outlay required is small, and meat may be produced at a lower food cost than any other kind of livestock. A pound of pork can be produced upon about half the amount of feed required to produce a pound of beef.

SHEEP

The validity of the ancient adage, "The hoof of the sheep is golden," has been amply demonstrated at times in this State; at other times it has been convincingly repudiated. During the century covered in this survey, the animals with golden hoofs have climbed the heights only to fall into comparative insignificance thereafter. The history of no other farm animal is fraught with more devastating vicissitudes, interspersed with periods of great prosperity.

In 1840 nearly every Pennsylvania farm had a flock of sheep; they brought in more money than any other livestock except cattle. Sheep were kept chiefly for wool, not for meat. The "Merino craze" of the 1830's, when the price of fine wool soared to over a dollar a pound, ushered in a brief period of speculative sheep husbandry. This passed soon after 1840, but many farmers continued to maintain large flocks and to sell their clips for fair prices. The maximum number of sheep was reached in 1850, when 1,822,000 were reported, or about eight per cent of the national total. In 1846, according to Thomas H. Burrowes, "In some counties many thousands of Merino, Saxony, and other fine-wooled sheep are now owned. In others, the Bakewell, Southdown, and other animals with long and comparatively fine fleeces, and superior mutton are raised. Few farmers in any part of the state are now without a flock of these useful creatures."[71] In 1849 wool was said to be "perhaps more extensively grown [in Washington County] than in any other county in the Union."[72]

A glimpse of this highly profitable period is given in *Pennsylvania Farmer:* "In Crawford, Erie, Venango and Mercer Counties, . . . it was the custom of capitalists to invest their money in sheep, and let them out to their less fortunate neighbors on shares for a rental of half the wool and half the increase of the flock. This was vastly profitable to the capitalists, but . . . it enabled the poor man to get a start with a flock of his own. Later on it became customary to the renter to deliver a pound of wool per head each year for rental."[73] The tariff Act of 1842 imposed a duty of forty per cent on imported wool and woolens; this was a great stimulus to the industry. Small woolen mills sprang up all over the state where water power was available. Public meetings were held to secure subscriptions to stock in these mills. There was expectation of large profits; the sheep producer's dreams were rosy.

The wool industry was scattered all over the State, but was most highly concentrated in the southwestern counties. In the southeast there was a thriving mutton industry; many western sheep were purchased from drovers in the fall, fattened during the winter, and sold in the spring.[74] In 1848 it was noted that 25,000 head of sheep were driven into Delaware County each year to be "fatted on our usual spare pasture after harvest, and sold principally for the Philadelphia market."[75]

The inflationary bubble collapsed soon after 1850. The tariff Acts of 1846 and 1857 reduced the duty to about half that of the Act of 1842. Hard times resulting from the panic of 1857 set in. Many woolen mills were closed—110 within two years. It was increasingly difficult to meet competition from the West; it cost one to two dollars a head to raise sheep in Pennsylvania, twenty-five to fifty cents in the upper Mississippi Valley. With rapidly increasing population, depredations on flocks by dogs became a major factor in determining the success of the enterprise. Dairying began to supersede sheep husbandry "because almost any kind of business will pay better than growing wool at two and a half pounds a fleece which sells for less than twenty cents a pound." Between 1840 and 1850 the number of sheep in Chester County declined from 56,000 to 13,000; and in Lancaster County, from 41,000 to 19,000.

The tariff Acts of 1861 and 1867 established higher duties on wool and gave new hope to discouraged graziers. The Civil War also had a stimulating effect. By 1880 the number of sheep, which had dropped to less than 1,200,000 during the lean years, had again climbed to 1,776,000. This was the last great upsurge of the industry. Thereafte the decline was continuous, mainly because of western competition and dogs. Frequent tinkering with the tariff did not help matters any Between 1900 and 1910 the sheep population of the State declined forty-three per cent. By 1940 it was 356,000, a new low for the century More than half of these were in Greene and Washington counties After 1920 Greene County replaced Washington County as leader in sheep husbandry; in 1940 it had more sheep and produced more woo than any other county east of the Mississippi. Merinos predominated

During World War I there was a brief flurry in wool. The price had drifted downward from about fifty cents a pound in 1850 to twenty eight cents a pound in 1910. The war-time demand was so heavy that in 1918 prices soared to three times the pre-war level. The Pennsylvania Department of Agriculture offered to place 5,000 ewes o farms, provided the wool clip and meat were shared with textile manufacturers and other financial backers of the program. Not man farmers found this scheme practicable. In 1940 a few small rura woolen mills were still in operation, remnants of the hundreds of century earlier; but most of the woolen industry was concentrated i large urban mills mainly in Philadelphia, and less than four per cen of the wool they used was produced on Pennsylvania farms.

The breeds of sheep kept in Pennsylvania have reflected the relative profit in wool and meat. Prior to 1840 there was very little market for mutton, which was considered an inferior meat; sheep were grown mainly for wool. While the price of wool was high, Merinos predominated. After the collapse of the market for wool, beginning about 1850, the interests of stockmen in the southeastern counties were directed toward the production of meat. At the first exhibition of the State Agricultural Society, in 1852, no fine wool breeds were shown; all the entries were Southdown, Cotswold, and "native." The following year Southdown, Leicester, Oxfordshire, and Saxony were entered. In later years Hampshire, Dorset, and Shropshire became prominent, but Southdown continued to lead. After 1900 the marketing of ancient wethers for mutton largely ceased and the fattening of lambs four to six months old became common, especially in the southeastern counties. About 1920 a small area near Philadelphia and New York began to produce lambs out of season; these were commonly called "hot-house lambs." Ewes were bred in May and June and lambs marketed in October and November, when weighing twenty-five to fifty pounds.

In 1918 it was estimated that twenty-five per cent of Pennsylvania sheep were of the fine-wool type, forty-five per cent of the mutton type, and thirty per cent cross-breeds.[76] By that time the drift toward the mutton type was strong except in southwestern Pennsylvania; two-thirds of the rams were of mutton breeds. In Greene and Washington counties the fine wool breeds, chiefly Delaine Merino, were grown almost exclusively. These two counties have been famous throughout the nation as a center for this breed; they have supplied much of the foundation stock of the western range country. Purebred Merinos have been bred in these counties for more than 125 years, in some cases continuously by the same family. Better breeding and feeding have resulted in a market increase in the average weight of fleece—from two and a half pounds an animal in 1860 to about eight pounds in 1940. Most sheep now are shorn by a machine with which one man can shear 100 to 150 a day.

The marketing of wool has been facilitated by the organization, through Agricultural Extension, of county or community wool-marketing cooperatives, beginning in 1919. In 1940 there were twenty-two such cooperatives, serving 5,000 farmers at a marketing cost of slightly less than half a cent a pound. Philadelphia continues to be the outstanding market for wool because of its large number of woolen mills. In recent years there has been a declining consumer preference for wool because of the competition of new and attractive textiles.

Since early colonial days the chief hazard in sheep husbandry has been depredations by dogs. Marauding dogs have wiped out or seriously decimated the flocks of many farmers. Loss by bear, panther, and wildcat practically ceased after 1875 except in thinly populated mountainous districts. As late as 1934 it was reported, "Recently a large lynx was shot in Greene county after it had killed many sheep and chickens. . . . Last spring five [coyotes] were shot in Washington county . . . after causing considerable losses to sheep owners."[77]

With the industrialization of the State, the number of killer dogs increased greatly. Speaking of conditions in the Wyoming Valley about 1850, Henry B. Plumb said, "So many of the population of [Hanover] township, were now foreigners working generally at the mines, and each family having at least one dog, if not two, and three, that it became impossible to keep sheep. The writer knew one dog to kill 117 sheep in one summer."[78] On December 24, 1859, the *Lawrence Journal* recorded, "On Saturday night last John Prowdfit of Washington County had fifty-five of his finest Spanish Merino sheep killed by dogs." The dog law of April 14, 1851, gave little relief, since the depredations were committed mostly at night. It provided, "It shall be lawful for any person to shoot or kill any dog or dogs found or known to be chasing or worrying sheep . . . without liability . . . to pay any damage therefor. . . . The owner . . . of any dog or dogs shall be liable for all damages done."[79]

On June 12, 1878, "An Act for the Taxation of Dogs and the Protection of Sheep" was approved. It was intended to provide township funds for payment of damages, but it was ignored in most counties. At best, the amount of the dog tax collected by local authorities was wholly insufficient to pay for losses. This unsatisfactory situation continued until after 1917, although some progress was made in law enforcement. In 1913 there were 6,393 sheep killed and 4,845 injured, for which $54,322.70 was paid in indemnity.[80] The number of dogs killed that year was 1,419. In most counties funds for paying claims were exhausted two or three years in advance of payment.

There was bad blood between some sheep owners and dog owners; when a farmer of Cambria County undertook to rid his farm of sheep-killing dogs, it was said, the dog owners burned down his barn.[81] In February, 1917, two dogs which were caught in the act killed fifty of the fifty-four sheep of Henry K. Reed of Beaver County; thirty-eight of those killed were with lambs.[82] It was estimated at that time that there were 10,000 dogs in Beaver County, not half of which were licensed.

The dog law of 1917 was somewhat more effective than preceding laws, especially the provision for supervision by the Pennsylvania Department of Agriculture of its enforcement by county officials, but little progress was made until the dog law of 1921 went into effect. This placed full responsibility for licensing and enforcement in the Pennsylvania Department of Agriculture, and license fees were paid directly into the State treasury. The Department inaugurated a program of strict enforcement. During the eleven years 1922-1933, more than 203,000 stray and unlicensed dogs were killed, and $791,000 paid in damage claims for 66,000 sheep killed or injured. By 1940 the killer dog was well on his way to extinction.

OTHER LIVESTOCK

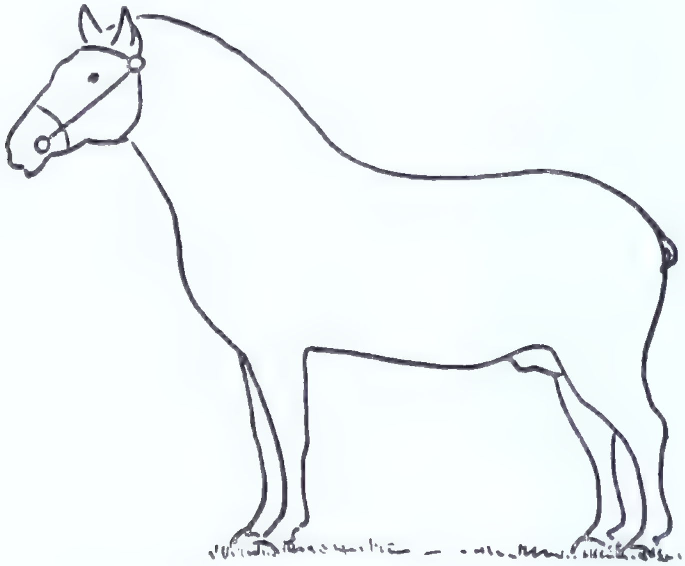
Until about 1860 the long-standing controversy as to the relative merits of oxen and horses as draft animals raged with unabated fervor. At many agricultural fairs plowing and pulling contests between the two were prominent attractions. After 1860 the issue was settled in favor of the horse, primarily because of the more rapid pace with which it could haul produce to market. The building of turnpikes and the growth of cities increased the demand for horses. Oxen gradually disappeared from the rural scene, although they were superior to horses in cost of upkeep and for working on rough land. Between 1850 and 1890 the number of horses on Pennsylvania farms almost doubled—from 350,000 to 618,000.

Even when horses were the main dependence of Pennsylvania farmers for power, not enough were raised in the State to meet the need. In 1850 only about half the horses in Chester and Delaware counties were raised locally; the remainder were purchased in Ohio and other western states. Said Thomas H. Burrowes in 1846, "In the western country [of Pennsylvania], . . . where many horses are raised for sale, little attention is paid to them, till they are four years old. Before that age, they are permitted almost wholly to shift for themselves, both in summer and winter. This want of care, though it renders them hardy, has the effect of stunting their growth."[83] The failure of Pennsylvania farmers to realize the potential possibilities in horse breeding continued. In 1903 it was stated, "the farmers of Pennsylvania do not produce nearly so many horses as are needed to carry on the work of the State, and horses and mules are imported in large numbers from the west. They are, however, still sold in all the eastern markets, and for exportation a large number of horses, classed as Pennsylvania draft horses. Many of these horses are western horses that have been fed and fitted for market on the farms of Pennsylvania. . . . In connection with the vast industrial enterprises, mining, oil production and commerce of the State, more horses and mules are employed and used than in any other state."[84]

Sick horses were not helped much by the ministrations of the untrained "horse doctors" of that time or by the home remedies recommended by Isaac Leib of Manheim, Lancaster County, in his *Horse Medicine,* which was printed at Lebanon in 1842.

The heavy demand for horses during the Civil War sent prices into an inflationary spiral. In 1861 the editor of *Farmer and Gardener* wrote scathingly of war-time profiteers in horse flesh: "A great amount of outrageous imposition has been practiced on the Government in the purchase of horses for the army. Many have been purchased that are wholly unfit for cavalry service and some that are seriously diseased. Uncle Sam is regarded as a legitimate subject for fleecing. Every dollar that can be made out of the public purse is looked upon as having been honestly gained and to be boasted of publicly."

In 1876 William H. H. Davis wrote: "Among the institutions of the county [Bucks] are some fifty 'horse companies,' voluntarily chartered associations for the detection of horse thieves and other villains. They hold annual meetings and have a good dinner at the expense of the company. Some of these companies are almost as old as the century."[85] As time progressed these organizations tended to become more convivial than agricultural.



In 1910 horses were the most valuable livestock of Pennsylvania, being appraised at $68,055,000 as compared with $47,229,000 for all cattle. At that time about 50,000 horses were required annually for replacements. Most of them were purchased from western breeders for $200 to $300 each. On April 25, 1907, the General Assembly passed an Act requiring that all stallions standing for public service be registered. Of the 2,254 licensed in 1909, only 823 were purebred.

The shift from horse power to motor power began to gather headway about 1916. In 1909, Professor Mairs, of State College, expressed the opinion, "The horseless age is yet some years in the future. It is only in a few instances as in some delivery wagons, trucks, etc., that the horse has been displaced by the motor."[86] He was a poor prophet. In 1916 the State Department of Agriculture noted, "Motor trucks, farm tractors and other . . . machine drawn vehicles have replaced the horse in many lines of work. The prospects have been discouraged to those interested in horses."[87] Thereafter the horse rapidly gave way to its more efficient mechanical competitor in nearly all fields of service. Between 1910 and 1920 the number in the State dropped fifty-five per cent. During the first year of the operation of the amended stallion registration law of 1921, only 408 licenses were issued, of which 354 were for stallions of the draft type.

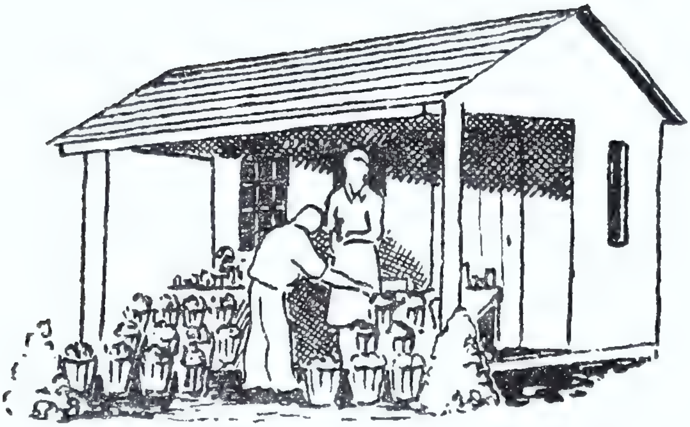
In 1940 nearly two-thirds of the farms of the State still had horses or mules, but the number had declined to 309,000.[88] They were used mainly to supplement the tractor and truck, especially on rough farms. During World War I, when the price of farm machinery was almost prohibitive and gasoline was rationed, some farmers found horse power more advantageous than motor power because they could produce horse feed on the farm. In 1940 Lancaster County led in number of horses, partly because the Old Order Amish of that county do not use automobiles, trucks, or tractors, as a matter of religious conviction. Since 1850 the number of mules, as compared with horses, has steadily increased.

Aside from the famous Conestoga draft horse of Lancaster County, which passed out about 1850, no native breed has been developed in this State. Since 1850 the Percheron, mostly grades, has predominated. In 1920 only one per cent of the draft horses were purebred; of these, fifty-eight per cent were Percheron. The popularity of this breed dates from 1851, when the celebrated stallion Louis Napoleon was imported from Normandy, France. The draft horse is the only type that has survived on Pennsylvania farms; the coach or carriage horse, the light harness horse, the small farm chunk, and the saddle horse have almost completely disappeared. Gone are the splendid Morgans of the nineteenth century, in which the owners took such pride. Something has been lost in rural life with the passing of the horse; one cannot have as much affection for a piece of inanimate machinery.

Goats and Belgian hares are sparingly distributed. An Angora goat craze of considerable proportions swept the State between 1870 and 1880, but the immense profits promised by promoters failed to materialize. Interest in milch goats began to develop about 1920; by 1940 they were the basis of a small but thriving industry. The hope of fabulous profits held out by promoters of Belgian hares has tempted many, mainly town people. It was difficult to develop sales resistance against such alluring prospects as, "Raise Belgian hares for us. Huge profits are easily and quickly made. We furnish the stock and pay you $6 a pair for all you raise." A few made the enterprise pay, but the majority learned the bitter truth in that gem of Biblical wisdom, "The fool and his money are soon parted."

Although not "livestock" in the common usage of the term, bees are an important side-line of many farmers, and they command the enthusiastic interest of a number of specialists. In 1940 approximately 30,000 people kept 178,000 colonies of bees, which produced $294,000 worth of honey.[89] Crawford and Bradford counties led in honey production. In 1911 the General Assembly enacted a law which required that bees be housed only in movable frame hives. This facilitated inspection of the colonies periodically by the Pennsylvania Department of Agriculture for the presence of American foul brood, a disease which has caused very heavy loss. At this point the old-time "bee gum" made its exit. After 1900 it became recognized that the value of bees as blossom pollenizers, especially of tree fruits, far exceeds their value for honey and wax production. Fruit growers began to keep them more extensively or to purchase "package bees" for use during the blossoming season.

XI



Roadside market

HORTICULTURE

AMATEUR horticulture—the culture of fruits, vegetables, flowers, and ornamental trees and shrubs for personal enjoyment—has been an important aspect of Pennsylvania home life, both urban and rural. In no other state is the amateur spirit more widespread and more enthusiastic. The time-honored Pennsylvania Horticultural Society is dedicated to this ideal. Commercial horticulture, on the other hand, is of comparatively recent development. It is one of the refinements of civilization that come only with the attainment of a considerable degree of urban prosperity.

For many years fruit growing was by far the most important phase of Pennsylvania horticulture largely because of the beverages that could be made from fruit. The once-plentiful supply of wild small fruits, especially strawberries, now is wholly inadequate. Only the huckleberry, plump and juicy from mountain lands, remains to remind us of the time when every pioneer family could satisfy its need for fruit at the bountiful breast of mother nature. In recent years vegetable gardening has rapidly forged to the fore, especially the production of canning crops. In the vicinity of Philadelphia commercial production of flowers and ornamentals is a major horticultural enterprise; there are more greenhouses and ornamental nurseries in this area than in any other part of the nation.

THE GOLDEN ERA OF FRUIT GROWING, 1845-1872[1]

The culture of fruits primarily for making "comfortable drinks," which characterized Pennsylvania horticulture prior to 1840, continued until about 1875. Practically every farm had a small orchard, mainly apples. The fruit was converted into cider and other beverages, fed to hogs, or made into apple butter, and the cellars were piled high with fruit for winter use. No picture of rural Pennsylvania at that time would have been representative that did not show a comfortable brick or stone house beneath a sheltering hill, a great bank barn, a springhouse in the meadow, and behind the barn an apple orchard—a garland of honeyed sweetness in spring, a cool retreat for swine and young cattle in summer, and a small boy's delight in autumn. Until after 1850 excellent fruit could be grown with little care; there were few serious insect pests and diseases.

Modern commercial fruit growing was born with the industrial revolution, from 1835 to 1860. These twenty-five years witnessed a transformation of the life of the nation from a population that was predominantly rural and agricultural to a population that was largely urban and industrial. The most important factor in the industrial revolution was improvement in transportation, from turnpikes to railroads. The immediate effect of railroad building was to extend the radius of the territory available for supplying food to a city from several score to several hundred, even several thousand, miles. City markets, the prerequisite of commercial horticulture, became available. The stage now was set for the great expansion of the fruit-growing industry that followed.

The twenty-seven years between 1845 and 1872 may be called the "Golden Era" of fruit growing in Pennsylvania. Optimism was unbounded; there was not a cloud in the sky, not even one as big as a man's hand. "Too many fruit trees cannot therefore, be planted," exulted Cyrus T. Fox in 1880. "Let 'fruit for the million' be the battle-cry of the fruit-growers of Pennsylvania."[2] The Berks County Agricultural and Horticultural Society offered substantial premiums to those who planted the largest number of fruit trees.

The heaviest planting was of apples. In 1850 *The Horticulturist* commented, "It seems as though every farmer in the East is planting an apple orchard." Most of the orchards were of one to five acres on general farms. They comprised what were known after 1900 as "the old, farm apple orchard," as distinct from commercial orchards. These orchards were almost completely neglected; they received little or no pruning, no spraying, and no fertilizing except the droppings of livestock pastured in them; yet they produced large quantities of good fruit. In 1872, the General Fruit Committee of the Pennsylvania Fruit Growers' Society spoke sorrowfully of the passing of "the time, and that not very long while since, when apples grew here almost spontaneously."[3] In 1850, John J. Thomas, an eminent New York pomologist, estimated, "It costs but two and a half cents a barrel to grow apples, which makes them the cheapest of all foods for man and beasts." Most of the fruit was destined for the cider barrel, but much of it, especially sweet varieties, was consumed by swine. Only a very small proportion was marketed.

This period was the heyday of the pear. At the meeting of the Fruit Growers' Association of Eastern Pennsylvania in 1860, the statement was made, and not disputed, "Pears do better everywhere in Pennsylvania than apples." In 1867 the same group discussed the question, "Is not the pear the most certain of the tree fruits in Pennsylvania?" The consensus was, "It is." In 1853, Patrick Barry reported, "Sales of pears have been made at Philadelphia this season at prices calculated to give an impetus to their culture. Duchess d' Angouleme sold at Isaac Newton's Fruit and Ice Cream Store on Chestnut Street for one dollar each. . . . One cultivator of this delicious fruit realized at the rate of $9,200 an acre."

One of the most famous pear orchards in the East was that of Tobias Martin of Mercersburg. In 1870, he sold his extra-fine Bartletts for $1.00 to $1.50 a dozen and his first-grade fruit of that variety for $4.00 a bushel.[4] Edwin Satterthwaite of Jenkintown was another famous pear grower. He had over 7,000 trees of 500 varieties. In 1870 he stated, "The prices usually received in Philadelphia are $8 to $12 per barrel." At that time pear trees were not seriously attacked by fire blight. In 1872 it was authoritatively stated, "So far as our information extends, there is no disease to which pears are subject in this State, that seriously interferes with their culture. Nor is the fruit . . . near so liable to injury from insects, as is the apple. . . . Nowhere in the country, (hardly excepting even California,) can finer or better pears be produced."[5]

Other tree fruits besides apples and pears were caught up in the inflationary spiral. The Chesapeake Bay region continued to supply Philadelphia with peaches by boat, but commercial orchards sprang up at a number of inland points, particularly in York, Lancaster, and Allegheny counties. In 1857 the State Agricultural Society was informed, "Of late years the peach has been probably the most valuable product of the soil. . . . Large orchards have been planted. . . . The average yearly profit is about one hundred dollars per acre."[6] Profits in peach growing, however, must have been transitory and localized, for we learn from a Beaver County farmer that in 1855 peaches, mostly seedling fruit, sold for ten to fifteen cents a bushel.[7]

The plum, also, had its brief day in the sun, although even then curculio-ridden. In 1854 the United States Patent Office imported from France a large quantity of cion wood of Prune d'Agen, later known in California as French prune. Much cion wood was distributed in Pennsylvania. It was confidently expected that this State would rival France in the production of prunes. Nursery trees sold for five to ten dollars each. At the exhibition of the State Agricultural Society in Pittsburgh in 1856, fresh prunes sold for fifty cents a quart. The trees produced fairly well, but the fruit was subject to brown rot and the climate was not favorable for sun-drying. By 1870 the hope of developing a prune industry in Pennsylvania had faded.

AT THE END OF THE RAINBOW, 1872-1900

At the end of the rainbow was found, not a pot of gold, but disenchantment. There were four main causes of the depression which gripped the fruit industry after 1872—post-Civil War economic maladjustments, competition from other states, over-planting in this State, and increasing loss from insect pests and diseases.

Railroads were not an unmixed blessing to Pennsylvania fruit growers. They helped develop local markets but they also opened the door to competition from distant fruit growing districts. By 1858, strawberries from Norfolk, Virginia, began to come into the Philadelphia market in quantity, mainly by boat; then Pennsylvania growers were forced to discontinue the culture of early varieties. Peach growers had a similar experience, beginning with the first shipments from Georgia, about 1865. In 1866 it was noted, "Peaches, carefully packed in crates, are sent from the neighborhood of Augusta to New York, the earliest varieties reaching this market from the 20th to the 25th of June, and commanding at first as high as from $15 to $20 per bushel. An average of at least $5 may reasonably be counted upon."[8] Florida oranges began to appear in Philadelphia in quantity about 1868.

The most serious competition, however, came from the Pacific coast. Completion of the first transcontinental railroad, the Union Pacific, in 1869, made possible the first all-rail shipment of California fresh fruits to eastern markets the same year. The Southern Pacific was completed in 1876 and the Santa Fe in 1885; these gave added impetus to the California fruit industry. In 1873 Tobias Martin of Mercersburg gave voice to inspired prophecy: "that California was going to knock our pear market all to smash."[9] It did. Navel oranges were introduced into California from Brazil in 1873 by William Saunders of the United States Department of Agriculture, previously a Philadelphia gardener. The first full train-load of California oranges was shipped into Philadelphia in 1882 and the first train-load of deciduous fruits in 1886. The first ship-load of bananas from Central America arrived in 1857, but the trade did not amount to much until after 1880.

The horicultural *debacle* of 1872 and the years immediately following was due, also, to over-production. The tremendous apple plantings of the '50's and '60's were just coming into full bearing. Methods of marketing were crude, and cold storage facilities were practically nonexistent. There were ruinous gluts in the autumn and a dearth of good fruit in late winter. Pests had multiplied enormously and there were no efficient means of controlling them. Fruit growers voiced numerous laments for "the good old days" when apples grew spontaneously. Said a Lancaster County grower in 1880, "We, at least in Lancaster county, cannot or do not raise our own supply of apples. . . . For a number of years past, we annually imported thousands of barrels of apples. . . . Borers, curculios, codling moths, fungi-pests that we then knew little or nothing of, no doubt contribute towards this result, but it is very questionable whether they are the main cause."[10]

This depressing story was repeated, with variations, year after year. Between 1872 and 1890, "the decadence of horticulture" was the theme of many doleful discussions. In 1881 a discouraged Berks County grower told his fellow-sufferers, "The market was glutted with fruit, and it scarcely paid to haul them [apples] from the orchard. . . . Wagon loads were hauled to the cider-mills . . ., where six cents per bushel was all that was paid."[11] In 1887 the State Horticultural Association debated the situation and concluded, "Fruit grown in Pennsylvania is not now a profitable business, . . . but it can . . . be made so."[12] The year 1891 was particularly disastrous; in many counties apples sold for five to ten cents a bushel. Hundreds of thousands of bushels rotted on the ground.

Pennsylvania apple growing was dominated by small orchards on general farms until after 1900; these were planted during the expansive years of 1854-1872. Usually there were ten or more varieties, with Baldwin predominating. The census of 1900 revealed that there were 11,500,000 apple trees, most of which were in orchards of this type. By 1930 most of them had disappeared, victims of neglect, and the apple industry had passed into the hands of fruit specialists.

One tree fruit continued to yield its increase in home orchards. Hardly a farm home in the State was without a few "pie cherry" trees; they came fairly true from seed and could be constantly renewed from fence-row seedlings. Moreover, they were far less subject to insect and disease attack than other tree fruits. Cherries were dried for use in pies or preserved with sugar. The wild sweet cherry or Mazzard, which grows spontaneously in fence rows, especially in the southeastern counties, continued to adorn the landscape with its garland of bloom in the springtime and to yield of its bounty in early summer, to the delight of children and the joy of the housewife.

PEACH FEVER

During this protracted period of hard times in apple growing, a few localities experienced good times in peach growing. Between 1885 and 1893 Juniata and adjacent counties achieved, briefly, a place in the pomological sun. The industry was started by Smith Brothers of Lewistown about 1875. The fruit was shipped to Philadelphia and Pittsburgh, and to mining towns. Profits from early plantings were so large that neighboring farmers began to plant peach trees instead of corn, and the industry spread throughout Juniata, Mifflin, Huntingdon, and Blair counties. In 1888 there were 300,000 trees in the Juniata district. Enthusiasm reached its height in 1890, when it was reported, "There are at present about two hundred and sixty thousand peach trees growing in Juniata county alone, one hundred and sixty thousand of which were planted last spring, and one hundred thousand more will probably be planted next spring, and there is no telling where it will stop."[13] The peach crop of Juniata County that year was 400,000 bushels which sold for $3.50 to $4.00 a bushel.

The fever ran its course in the usual way. Human judgment being as frail then as now, it was confidently expected that there would be no end to the golden harvest. Said the State Board of Agriculture in 1891, "A number of counties in the state bid fair to become the greatest peach-growing centers in the Union. Thousands of acres are being planted and growers are encouraged by remunerative prices."[14] The bubble burst in 1893, when the price dropped to twenty-five cents a bushel. After a few more years of ruinous prices, the golden-tasseled corn again waved triumphantly over land that for a brief period had witnessed the pink miracle of peach blossoms in the springtime.

Meanwhile another center of peach production was developing in Franklin County. Observing the success of a few pioneer peach growers just across the State line in Washington County, Maryland, several venturesome farmers planted orchards in the "South Mountain Peach Belt" near Waynesboro, in 1879 and 1880. Dividends from these were so gratifying that the orchards soon overflowed into Adams County; by 1895 there were 2,000,000 trees in the district, 500,000 in Franklin County alone. The loss of two successive crops by winter-killing, in 1898 and 1899, and the ravages of yellows discouraged many; but the industry has continued, with varying degrees of success, to this day.

In 1887 the plum, once an important fruit in Pennsylvania, was passing into comparative insignificance when it was granted a brief reprieve by the introduction of Japanese varieties. By 1900 these were planted extensively in all parts of the State. The crash came about 1905; there were far more plums than the market could absorb. Moreover, Japanese varieties were inferior in quality and were not hardy in bud. Since 1910, the plum has been a very minor factor in Pennsylvania fruit growing.

Although the quarter century from 1872 to 1900 was, in general, a difficult period for fruit growers, it witnessed a number of developments that paved the way for the remarkable progress that followed. Foremost of these was the introduction of the refrigerator car for transporting fruit, in 1887. Prior to that time the grower who lived 500 or more miles from his market never could be sure that his fruit would reach it in salable condition. The refrigerator car opened the excellent local markets of the State to distant competitors and challenged Pennsylvania growers to meet this competition. Another milestone was the introduction of spraying, about 1890, at a time when fruit growers were becoming disheartened by the rapidly increasing horde of pests. Other developments that helped to put the industry on a stable basis were the more general use of cold storage after the disastrous apple crop of 1896, the commercial exploitation of canning, and the more general application of science to the solution of the technical problems of the fruit grower that came with the organization of the State Agricultural Experiment Station in 1887.

Frenzied Fruit Growing, 1900-1920

The second great expansion period of Pennsylvania fruit growing, especially apples, was from 1900 to 1920. The foundation for this hectic period was laid in a sharp decline in the commercial production of apples after 1900, a national population increase of over 10,000,000 a decade, and great industrial prosperity. Even experienced fruit growers and hard-headed business men took leave of their judgment with as much abandon as had farmers during the Juniata peach craze. They followed the will-o'-the-wisp of easy wealth, only to find themselves at last mired in the swamp of disillusion.

The electric spark which fired this particular charge of dynamite was the very high prices received by apple growers of Hood River Valley, Oregon. This "Magic Valley" was, indeed, a pomological Eldorado—for a time. In 1906 Hood River apples sold for $2.60 a box f. o. b., and in 1908 for $3.27. Who could resist the urge to plant an orchard after reading this: "Fruit lands about Hood River are rapidly advancing in price; sales of bearing orchards for $1,000 an acre are not uncommon. Oscar Vanderbilt of Hood River sold forty bushels of Winter Banana to a Portland dealer for $8.00 a box. The dealer sold them to a New York buyer for $12.00 a box. This price nets the grower thirteen cents per apple"?[15]

The blood pressure of Pennsylvania fruit growers rose rapidly. Apples, and to a less extent peaches, were the royal road to riches. Nurserymen could not propagate trees fast enough to meet the demand. The landscape in Adams, Franklin, Berks, Lancaster, York, Chester, Montgomery, Allegheny, and several other counties, was dotted with young orchards. Between 1900 and 1910 more than 2,500,000 trees were planted. In 1915 thirty-one per cent of the 10,000,000 apple trees in the State were not yet of bearing age. *Fruits of Pennsylvania,* a book of 340 pages by a veteran grower, J. H. Funk of Boyertown, was a great stimulus to new planting.

The speculative craze reached fever heat in 1911 and 1912. Many orchard stock companies were organized by town business men; some of these planted orchards of several hundred acres at a heavy investment. In vain did conservative growers urge caution. "The planting of apple trees in the past five years has gone a wild and reckless gait," said Chester J. Tyson in 1912; "Many real estate development schemes based on orchard planting have been started in the east in the past year or two. Capital from our cities and towns has been persuaded into these schemes and some of them are doing a flourishing business, in the sale of land at least."[16] Some growers realized $1,000 an acre for the 1912 crop. Reaction came in 1913; the business of the country was in a slump. Fruit growers went around with long faces.

The entrance of the United States into World War I in 1917 changed the situation in a twinkling of an eye. The sluggish industrial life of the nation quickened into feverish activity; every wheel was set in motion, every tillable acre was requisitioned to produce food. The years 1917 to 1919 witnessed an orgy of speculation in fruit growing such as the State had never seen before. The tragic story is told in quotations from the press of that effervescent period:

"Stephen Bowers refused $125,000 last year for a fruit orchard that cost him $32,000 less than five years ago. . . . In 1918, orchards netted from $300 to $1,000 per acre from fruit and this year [1920] even greater profits may be realized. . . . One man paid $30,000 for an orchard this year [1920] and found that he had a crop sufficient to pay for the orchard this season."[17]

Alas for the frailty of human judgment! The year 1920 brought not "even greater profits," but collapse of the boom. The depression that followed was due not only to world-wide economic maladjustments following World War I, but also to over-planting, especially of apples. Some embittered growers were inclined to recall the incident in the Garden of Eden when woman—so the popular version of the Biblical story goes—tempted man to eat the apple and thereby brought disaster on the human race. In their discouragement they gave temporary assent to the words of a poet of another generation:

"Mankind, perchance, had wiser been,
More fit with fate to grapple,
Had Earth or Eden never known
A woman or an apple."

During this expensive period the Pennsylvania Department of Agriculture, through its Economic Zoologist, was active in educational work with fruit growers. In 1915 it had 262 "public demonstration orchards" or "model orchards," one or more in every county; field meetings were held to demonstrate methods of pruning, fertilizing, and spraying. It also had 1,051 "supervision orchards," which were visited weekly by a Department representative to advise the owners on cultural methods.[18] After 1916, the Agricultural Extension Service took over this educational program. The contribution of The Pennsylvania State College through research was greatly strengthened after 1907, when the State Horticultural Association requested it to make a study of factors that affect yield and quality in apple production. The "Old Experiment Orchard," which was planted at the College in 1907, yielded much experimental evidence of value to the fruit industry.

CHANGES IN CULTURAL METHODS

After 1920, competition from outside the State was intensified. By 1931 the California invasion had reached the astonishing proportions of 78,000 cars of citrus fruits and 16,000 cars of deciduous fruits. Grapefruit from Florida and bananas from Central America displaced many hundreds of thousands of bushels of Pennsylvania fruit. Train-loads of peaches from the South, arriving in early summer, took off the edge of consumer appetite for home-grown peaches. Many cars of Washington apples, which comprised about thirty per cent of the total crop of the nation some years, dispossessed home-grown fruit in local markets. There was a marked increase in the consumption of certain vegetables, particularly lettuce, spinach, and cantaloupes, at the expense of fruit. Canned and quick-frozen fruit began to cut heavily into consumption of fresh fruit.

Fruit growers have not benefited from mechanization as much as general farmers. The tractor-cultivator and power sprayer greatly facilitated these operations, but pruning and harvesting remain laborious hand operations. Grading machines merely size the fruit; there is no substitute for the human eye in sorting it as to color and freedom from blemish.

Fruit growers have become more dependent on government than any other farm group with the possible exception of milk producers. Until about 1890 they produced, packed, and marketed their crops as they pleased. The fruit grower of 1940, however, was the beneficiary of numerous federal and state laws and conformed, willingly or not, to numerous governmental regulations. His orchards and the nurseries from which the trees came were inspected for insects and diseases. His fertilizers and spray materials were analyzed. His fruit was inspected as to grade. He was advised both as to the probable size of the current crop and as to the outlook for the future. The middleman who sold his fruit was required to take out a license and give bond.

By 1940 fruit growing added $10,000,000 or more annually to the wealth of the State. The apple was the most important fruit, as it had been for three centuries, but the industry was becoming more diversified. In 1940 there were only 5,000,000 apple trees as compared with 11,500,000 in 1900, yet commercial production was much higher. The "old farm orchards" planted from 1845 to 1870 had practically disappeared, and the business was largely in the hands of fruit specialists. These were of two types—those who grew a succession of varieties for local markets, and those who grew only a few varieties, perhaps only three or four, for the wholesale market. The most prominent apple-shipping district was the northern part of Adams County; two adjoining townships in that county produced more than a million bushels in 1939. Parts of Franklin, York, Cumberland, and Lehigh counties also were important shipping centers. The 2,500,000 peach trees were mostly in Adams, York, and Berks counties. The 700,000 cherrry trees, mostly of sour varieties, were mainly in Erie and Adams counties.

Profits in fruit growing, as in general farming, depend on volume of business as well as on cost of production and price. By 1930 the tendency to plant very large orchards, which had been in evidence after 1900, was checked. Few very large "corporation orchards" were profitable, mainly because of high overhead and lack of close personal supervision. The most successful type of fruit growing was the orchard of moderate size operated personally by the owner, on a farm devoted chiefly, if not exclusively to fruit growing.

Between 1840 and 1940 current practice in soil management of apple orchards changed from permanent sod, usually pastured, to annual tillage with cover crops, then back to temporary sods not pastured. From 1840 to 1890, practically all bearing orchards except peaches were in sod. In 1852 William G. Waring expressed the prevailing opinion, that the worst enemy of the orchard was the plow. At the 1863 meeting of the Pennsylvania Fruit Growers' Society it was agreed that an orchard never should be cultivated after it commences to bear. The propaganda for annual tillage of orchards, which was brought to the East from California about 1870, made few converts in Pennsylvania until after 1890. Thomas Meehan of Philadelphia was the leading exponent of sod culture. In 1863, when the editor of *The Horticulturist* pontificated, "Nothing but fruit—not even a blade of grass—should ever be permitted to grow in the orchard," he staunchly advocated sods as most suitable under Pennsylvania conditions. Josiah Hoopes of Chester County was a prominent advocate of the sod mulch; "The grass and clover, when mowed off and allowed to lay as a mulch to the surface, acts beneficially to the trees, by keeping the soil moist and cool. . . . "[19]

Between 1890 and 1910 annual tillage with cover crops prevailed. It was discovered, however that this practice invited soil erosion and depletion of its organic content. After 1910, the sod mulch, as advocated by Josiah Hoopes half a century earlier, became popular for apples; annual tillage still was preferred for peaches. The sod mulch, however, invited serious injury to the trees by mice. About 1930, sod rotations or temporary sods again came into favor. In this method the sod, which is preferably of a perennial legume, is renewed every three or four years or partially chopped up each year with a harrow. This "new" practice has the sanction of antiquity; it was advocated nearly a century ago: "Another cause of early decay and general unthriftiness, is produced by suffering grass crops to grow in the orchard, more than two or three seasons without breaking up the ground."[20] In 1939 the Pennsylvania Agricultural Experiment Station summarized its studies on orchard soil management: "Sod management of orchards was found definitely superior as far as soil fertility is concerned, to either clean-cultivation or the use of annual cover crops. The use of sods increased the total nitrogen content over that of forest soil."[21]

Until after 1890 orchards seldom were fertilized except with the droppings of livestock pastured in them. Applications of manure, bone dust, and wood ashes were made occasionally. At that time the theory of fertilizing was to burn the plant, analyze the ash, and apply as fertilizer the materials it contained in largest quantity. In 1889 George C. Butz said, "Barnyard manure is occasionally applied to Pennsylvania orchards but most fruit growers realize that the plant food they need most is potash and are using Canada wood ashes, muriate of potash or kainit. Phosphoric acid, in South Carolina rock, is applied occasionally."[22]

The nitrogen era of orchard fertilizing was from 1900 to 1930. During this period nitrate of soda or sulphate of ammonia was applied alone in early spring, especially in sod orchards. Subsequently it was found that phosphorus may be needed fully as much as nitrogen, especially to promote the growth of sods, and that the maintenance of the organic content of the soil usually is far more important than the application of plant food.

In pruning, as in soil management, the pendulum has swung from one extreme to the other. From 1840 until 1890 the "natural method" was practiced by most growers. The majority opinion is 1886 was stated by E. L. Sharer: "So many orchards have been crippled and ruined by pruning, that my advice is, don't. Never learn to prune, and never prune. I have yet to see an orchard that has been benefited by the application of the knife, and I have never seen one that has suffered from the want of its use."[23] In 1868 Thomas Meehan of Philadelphia, one of the best-posted men of his times in horticultural science, stated a principle of pruning that now finds wide acceptance, especially in the pruning of young trees: "Pruning has a tendency to check the growth of the trees and should be practiced only to gain some other point."[24] In recent years the trend has been toward little pruning of young trees and toward moderate pruning of bearing trees, except the peach.

Between 1900 and 1910, there was much ado about the rejuvenation of old apple trees by "dehorning" the main limbs, even limbs six or more inches in diameter. Comparatively few of these amputated trees fully recovered from the shock. Important recent developments are the greater attention being given to shaping young trees so as to secure a strong framework of scaffold limbs; re-discovery of the ancient art of girdling or ringing young trees in order to hasten the time when they begin to bear, especially filler trees; and the use of asexually propagated rootstocks of known character on which to bud or graft varieties.

THE PROCESSION OF VARIETIES

The century from 1840 to 1940 saw the decline in Pennsylvania of the pear, plum, nectarine, apricot, quince, currant, and gooseberry, and the rise of the apple, peach, grape, raspberry, and strawberry. By 1880 the pear, once a close rival of the apple, had sunk into insignificance. The quince, neglected and almost forgotten today, was one of the most popular fruits prior to 1860, when every housewife prided herself on having a bountiful supply of home-made jellies, jams, canned fruit, and preserves. In 1840 a fruit grower remarked, "The quince is among the most profitable of our fruits, always finding a ready market at a generous price."[25] The currant and gooseberry suffered a similar fate. Thus fruits, as well as varieties, rise and fall in popular favor.

Until after 1840, variety names meant little to general farmers who grew most of the fruit, however discriminating fruit specialists might be in this respect. Itinerant grafters worked over established seedling apple orchards to numerous sorts of their own choice, many of which were worthless. In 1902 Gabriel Hiester stated, "The great majority of farmers report that they bought their fruit trees from tree pedlars and depended on the pedlars' judgment in the selection of varieties. They do not know what varieties they have; they only know that many are worthless and few are good."

Between 1850 and 1890, named varieties increased rapidly. Variety discussions occupied most of the programs of meetings of fruit growers. How earnestly, even truculently, our horticultural forebears debated the respective merits of varieties! Each grower had favorite sorts and championed them against the favorites of all other growers. There was little recognition of the influence of location and soil on variety adaptation. If a certain variety of pear did well in the orchard of Edwin Satterthwaite of Jenkintown, said Satterthwaite could see no valid reason why it should not be equally successful in the orchard of Tobias Martin of Mercersburg, unless it was conceded that Mr. Martin was not as skillful a cultivator as Mr. Satterthwaite! So the debate waxed warm and often so personal that it splintered the gavel of the presiding officer. Variety discussions held the center of the stage until about 1890, when cultural problems became subjects of greater interest. Not until after 1910 did marketing problems receive much attention.

Among the hundreds of varieties in orchards between 1840 and 1900 these were most common:[26]

Apples. American Pippin, Aunt Mary Sweet, Baldwin, Beauty of Kent, Bellefleur, Belmont, Black Gilliflower, Blue Mountain, Cooper, Dimick, Early Harvest, Early York, English Winter, Evening Party, Ewalt, Fallawater (Tulpehocken), Fall Pippin, Fall Sweet, Fanny, Gate, Gilliflower (Sheepnose), Golden Pippin, Green Newtown Pippin, Green Pippin, Green Winter Sweet, Grindstone, Harvest Sweeting, Hiester, Hubbardston, Jersey Sweet, June, Klaprath, Maiden's Blush, Orange Winter, Porter, Pound Sweet, Ledyard, Long Island Russet, Newtown Pippin, Northern Spy, Norton's Russet, Paradise Winter Sweet, Philadelphia Pippin, President, Red Astrachan, Rhode Island Greening, Ribston Pippin, Ridge Pippin, Romanite, Rome Beauty, Roxbury Russet, Smith's Cider, Smokehouse, Sour Vandevere, Spice, Spitzenburg, Summer Pearman, Summer Rambo, Swaar, Sweet Bellflower, Sweet Bough, Sweet Vandevere, Warren Stripe, Water, White Winter Pearman, Westfield Seek-no-Further, Wine, Winesap, Winter Rambo, Winter Sweet, White Doctor, Yellow Russet, York Imperial.

Pears. Anjou, Bartlett, Belle-et-Bonne, Belle Lucrative, Bosc, Diel, Doyenne d' Ete, Duchess d' Angouleme, Howell, Kieffer, Lawrence, Osband's Summer, Seckel, Sheldon, Superlative, Tyson, Urbaniste, Vicar of Winkfield, Winter Nelis.

Plums. French Prune, German Prune, Italian Prune, Green Gage, Jefferson, Richland, Yellow Gage, Washington.

Peaches. Crawford Early, Crawford Late, Druid Hill, Globe, Grier's Late, Hale's Early, Large Early York, Oldmixon Free, Red Cheeked Melacaton, Smock, Stephen's Rareripe, Stump-the-World, Susquehanna, Troth's Early, Ward's Late.

Cherries. Black Tartarian, Bleeding Heart, Early Richmond, English Morello, Governor Wood, Late Kentucky, Montmorency, Yellow Spanish.

Pennsylvania has been a prolific source of named varieties but only a few of them have attained more than local prominence. Among these are York Imperial, Smokehouse, Fallawater, Rambo, and Smith's Cider apples, Seckel and Kieffer pears, Susquehanna and Globe peaches. For some years York Imperial led all other sorts in the commercial apple orchards of the State; it still is a major variety. On August 18, 1920, the State Horticultural Association dedicated an attractive stone marker to Jonathan Jessup, who introduced it, on the farm near York where it originated as a chance seedling.

After 1900 a host of new varieties appeared, some of which dispossessed the favorites of earlier years. The most important changes in the apple list were the displacement of Baldwin by Stayman and York Imperial, beginning about 1905; the onward sweep of Delicious and McIntosh after 1915; and the waning popularity of Grimes and all other yellow varieties. In 1911 Gabriel Hiester stated, "The Baldwin apple . . . is the standard by which other varieties are measured."[27] At that time it comprised twenty per cent of all the trees, yet by 1920 it was in fourth place, being preceded by York Imperial, Stayman, and Grimes. After 1930, several highly colored strains of standard red varieties which had originated as "bud sports," as Red Rome, Staymared, and Starking, began to supplant their less attractive parents.

The Elberta peach came into prominence in the '80's and soon almost completely displaced other sorts. By 1895 the Kieffer pear, which was first fruited at Philadelphia in 1873, had superseded most other varieties except Bartlett for commercial planting. Its poor quality soon brought home-grown pears into such disrepute that California and Oregon had no difficulty in capturing the market with their more delectable Anjou, Bartlett, and Winter Nelis.

A new era in the production of varieties began about 1900. Plant breeding became a more exact science following the re-discovery of Mendel's laws of heredity. Previously most varieties originated as chance seedlings; they were merely found. Thereafter a much larger proportion was originated by plant breeders. An important recent development is the application of the science of systematic botany to the problem of trees "not true to name." For many years this was a serious source of loss to fruit growers. About 1920 it was discovered that the major commercial varieties, at least, could be identified readily in the nursery row by botanical characters. Most nurserymen now "rogue" trees in the nursery for trueness to name.

A trend toward the planting of fewer varieties began about 1900. Previously most growers who catered to local markets had thirty or more; some had several hundred. Large commercial orchards planted after 1900 had few varieties, perhaps only three or four, because of the advantage of having a large quantity of each to sell. Variety limitation, however, may proceed too far. The advantage of cross-pollination between varieties was first brought prominently before the public in 1894 by M. V. Waite of the United States Department of Agriculture. Two Pennsylvania horticulturists, however, had laid the foundation for this practice many years before. About 1850, "barren" or "sterile" trees and orchards, especially of pears, began to attract attention. The prevailing opinion at that time was that the blossoms failed to set fruit because of excessive vegetative growth. In 1866 Dr. J. S. Houghton of Philadelphia inquired, "As to the cause of unfruitfulness in certain pear trees which often blossom very freely, yet never set or perfect much fruit? One of those unfruitful varieties is the Duchesse d' Angouleme. . . . I have been led to inquire whether this is not in consequence of an imperfect condition of the blossoms?

Whether they are not either too intensively staminate, or deficient in the pistils. . . . If the pistils are perfect and the stamens defective, could not the blossoms be impregnated by growing some good staminate blossoms or grafts on the same tree, or by growing some other free blooming pear near them?"[28] In 1870 Josiah Hoopes of West Chester examined the pollen of many varieties of apples and came to the conclusion that the main cause of sterility was lack of viable pollen. He recommended cross-pollination through mixed planting of varieties.[29]

Unfruitfulness because of self-sterility was aggravated by the planting of few varieties in large blocks and by the declining number of wild pollinating insects. After 1910 the problem was met by planting blocks of a pollinating variety near self-sterile sorts. For temporary relief, blossoming branches of the pollinizer were hung in trees of the self-sterile varieties. Honey bees, the most active agent in the transfer of pollen, were kept more generally by fruit growers. Some found it more practicable to rent colonies during the blossoming season, or to purchase "package bees" from the South each spring.

FRUIT PESTS MULTIPLY

The few orchard pests in Centre County in 1852 were enumerated by W. G. Waring: "Caterpillars are not numerous and are easily destroyed. Aphids seldom injure any shoots but the over-luxuriant. Canker worms and borers are unknown here. The most obnoxious pest of the apple is the worm at the core. . . . There has been no blight but of rank shoots for years. The plan of keeping swine in the plum orchard has been tried here with entire success. The Yellows have swept off thousands of peach trees."[30]

After 1860 the codling moth received special attention. Control was sought by scraping off the rough bark, keeping livestock in the orchard, and winding a band of cloth or hay around the trunk to entice pupating larvae. In 1871 a public spirited fruit grower announced "a simple, practical method of exterminating this pest . . . at an expense which will not exceed $1.50 per acre. About the first of June, take a whisp of rags, cotton or woolen . . . and place these rags in the lowest forks of the apple tree, or wind several thicknesses of rags about the base of the tree, or both. All the worms descending and ascending will crawl in and remain. Now we know where the apple worm is. How shall we kill him? Take a clothes wringer, . . . place an end in the jaws of the wringer and run the rags through, every worm is annihilated."[31] No less simple were the recommended preventives of fungous diseases. In 1844 a Cumberland County farmer gave wide publicity to a specific for the control of bitter rot of apples. He informed *The Cultivator* that "A neighbor of his had two apple trees, the fruit of which was much affected with *bitter rot.* Noticing that the ground under the trees was covered with White Plantain, which he thought indicative of a poor soil, he manured the ground heavily with stable manure, and the result is that the trees bear annually fine crops of fruit, not in the least subject to the rot."[32]

After 1865 the loss from pests became much heavier. In 1872 the General Fruit Committee of the State Fruit Growers' Association reported, "The great obstacle to the production of [apples] . . . is unquestionably the ravages of insects. It is probable that more than one-half of all the apple trees planted hereabouts are killed by the apple tree borer. . . . Curculio and codling moth, (principally, perhaps the latter,) are what destroy the apple crop of Pennsylvania."[33] What German farmers called fire blight killed many pear and quince trees. There was disconsolate discussion about "the degeneration of orchards."

The status of insect control measures in 1871 was given by S. S. Rathvon, an eminent entomologist of Lancaster:[34]

Oyster-shell scale—Paint the limbs with whale oil soap or neat's foot oil.

Borers—Cut them out. Cover the base of the tree with tin or paper protectors.

Canker Worms—Place a band of sticky material around the trunk.

Tent Caterpillars—Cut out the egg masses in winter. Burn the nests in the spring.

Aphids—Syringe them with tobacco decoction.

Curculio—Keep live stock in the orchard; jar the limbs and collect the insects on sheets.

Codling Moth—Scrape off the loose bark. Band the trees and collect the cocoons. Keep livestock in the orchard.

Between 1870 and 1880, the idea was current that many insect pests could be controlled by birds. With this in view, English sparrows were imported into the United States about 1880 by E. Lewis Sturtevant. He and many others lived to regret it. By 1878, many fruit growers were desperate; some cut down their orchards.

At this critical juncture a new control measure for codling moth was developed. In 1881, J. S. Woodward of Lockport, New York, advised to apply Paris green, one pound to 100 gallons of water, by means of a force pump, when the young fruit was in an upright position. This counsel was received with skepticism in Pennsylvania. In 1883, Entomologist S. S. Rathvon asserted, "I have not heard that [this] remedy has had any following at all."[35] In 1887, the State Horticultural Association debated the question, "Should we as a Society encourage the use of Paris green for the destruction of codling moth?"[36]

Progress in disease control was even slower, largely because life-history studies on the nature of fungous and bacterial diseases had not been made. Periodic outbreaks of peach yellows devastated orchards; the epidemics of 1851, 1874, and 1886 were particularly destructive. Many theories as to the cause of yellows were advanced; usually it was ascribed to "sour sap resulting from immature wood that has been frozen." One of the first to suggest the parasitic nature of the disease was Josiah Hoopes of West Chester. In 1870, he observed, "The Yellows presents every feature of an organic disease. A dissection of a diseased tree plainly shows that a poisonous *virus* has penetrated to every part of it. That is why the disease is so easily communicated to healthy trees in pruning."[37]

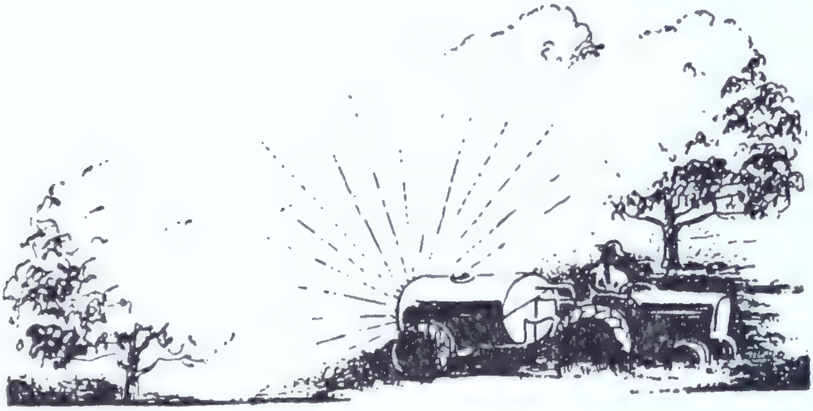
The first State regulatory legislation for the benefit of fruit growers was the Peach Yellows Act of May 26, 1891. It provided that all trees infected with the disease be destroyed by the owners. The law was ineffective, largely because enforcement was left to the discretion of local officials, many of whom were reluctant to incur the ill will of their constituents. So great was the destruction by this disease that in 1893 Cyrus T. Fox of Reading stated, "There are now only a few favored peach belts in the State which have escaped the 'Yellows,' and unless steps are taken to enforce the law of 1891, they will share the fate of other sections of the State where peaches, years ago, were a sure and most valuable crop, but where scarcely a healthy, bearing tree can now be found." Not until responsibility for nursery and orchard inspection and the destruction of diseased trees was lodged with the Pennsylvania Department of Agriculture was there any abatement of the disease.

No progress was made in fire blight control until after 1900, even though its bacterial origin had been announced by Burrell in 1878. There were numerous proposed preventives, such as soaking the ground with soap suds or driving rusty nails into the trees to give them an "iron tonic." Black knot of plums and cherries was thought to be due to "the sting of an insect." In 1867, John F. Bennett of Pittsburgh announced that he had discovered the cause of rot of grapes: It is a "blow or wound received, more or less minute, causing death to the part receiving it, and spreading its decomposition into the parts surrounding. What is there in nature gives blows causing death? Lightning does."[39] In 1887, the General Fruit Committee of the State Horticultural Association attributed the rotting of plums to "some mysterious climatic influence and no remedy is likely to be found." Yet in 1868 William Saunders of Philadelphia had advised Pennsylvania fruit growers, "I have come to the conclusion that lime and sulphur are disastrous to all fungous matter."[40] He advised them to dust grapes with sulphur to control rot and mildew; some did so with satisfactory results.

After 1875, complaints about "fungoid troubles" became far more numerous, particularly brown rot of peach and black spot (scab) of apple. In 1882, Millardet of Bordeaux, France, observed the benefit from applying a mixture of copper sulphate solution and lime to grapes in the control of rot and mildew. Thus was born Bordeaux mixture. In 1885 this spray was introduced into the United States, but it was not used to any extent until after 1890.

THE RISE OF SPRAYING

Relief was at hand. The first orchard spraying in Pennsylvania was in 1889, when H. M. Engle of Marietta, Lancaster County, sprayed his apple trees with London purple for codling moth and curculio. The subject of spraying fruit trees was first discussed by the State Board of Agriculture in 1890.[41]



Speed orchard sprayer, 1940

Most early spraying was directed solely against insects. In 1888, W. A. Buckhout summarized current knowledge of orchard spraying: "I regard the practice of spraying fruit trees as an exceedingly promising one. . . . Heretofore, I believe, [these processes] have been employed solely against insect ravages. I suspect that there is a further and a wider use . . . [against the] agency, suspected to be of fungal nature which produces much the same result as does insect attack."[42] By 1892 the results of research by the recently organized State Agricultural Experiment Stations began to be available. In that year the Pennsylvania station published its first bulletin on the subject. The outfit recommended for large operations was "an iron pump fitted with ten feet of discharge hose, and a graduating spray nozzle. . . . The pump is attached to a good barrel. . . . The price of this outfit, not including the barrel, is $12.00."[43]

Gabriel Hiester of Dauphin County was one of the first to adopt the recommendations of the Experiment Station. He abandoned the practice of bagging grapes to control black rot and sprayed them with Bordeaux. For a time objection was raised by consumers to the use of this spray; they thought the spray residue on the fruit was poisonous. Grapes that were stained with Bordeaux shipped to the Philadelphia market were boycotted. This misunderstanding was cleared away by 1895. The first spraying calendar was issued in 1894;[44] the fungicides recommended were Bordeaux, ammoniacal carbonate of copper, and copper sulphate; the insecticides were Paris green and kerosene emulsion.

Very little progress was made in spraying until after 1900; the benefits were undoubted, but only a few growers sprayed. Their reluctance to adopt the new practice was due, in part, to the prevailing business depression and low prices for fruit; there was little inducement to invest in new equipment. At the 1902 meeting of the State Horticultural Association, R. L. Watts commented, "Spraying to combat insects and diseases has made no material progress; neglect is the rule and poor fruit the consequence."

At this juncture there appeared on the scene a new insect pest which immediately compelled attention—the San Jose scale. This insidious pest struck terror to the hearts of fruit growers everywhere. Observing how quickly it could kill an orchard, they were ready to adopt any measures that the Experiment Station might suggest. The present generation of fruit growers, who live in the security of an effective spraying program, can hardly imagine the furor that was created when it became known that the scourge had become established in this State. The first infestation reported was in December, 1894, by George G. Groff of Lewisburg.[45] In 1895 it was found at several other points in the State.[46] The fear was openly expressed that the pest might "wipe out the fruit industry." Since practically all infestations could be traced to infested nursery stock, there was much recrimination between growers and nurserymen.

The danger from San Jose scale had not been exaggerated. It swept through orchards with a virulence equalled only by early outbreaks of peach yellows. Hundreds of thousands of apple and other fruit trees were killed or so weakened that they fell an easy prey to winter injury, drought, and borers. In 1903, John P. Fredd stated, "If something is not done to exterminate the pest, fruit growing is doomed in this State."[47]

Here was a problem for the Agricultural Experiment Stations to solve. They accepted the challenge and met the test. At first, crude petroleum, whale-oil soap, and kerosene sprays were used, with varying degrees of success. In 1902 the lime-sulphur-salt wash, or California wash, was brought to the East. It gave immediate relief. The Pennsylvania Department of Agriculture waged a far-flung spraying campaign against San Jose scale. It held numerous demonstrations of the preparation of the lime-sulphur-salt wash and organized groups of growers whose orchards were sprayed by custom service; in 1907 there were over 100 such groups in twenty-six counties. On April 28, 1899, the General Assembly enacted a law requiring nurseries to sell only stock free from peach yellows, black knot, fire blight, and San Jose scale, and to fumigate it before sale. By 1909, the State Horticultural Association was able to report, "We no longer dread the San Jose scale." What was even more important, fruit growers now were launched on a program of orchard spraying which has continued to this day with ever-increasing benefit to the industry.

After 1900 improvements in spraying materials and equipment came rapidly. The whole spraying procedure was in a constant state of flux; the best practice of one year might be outmoded the next. About 1890, upright single-action hand pumps gave way to horizontal double-action hand pumps. A few steam engine outfits were used about 1895; by 1905 these had been displaced by two-horse-power gasoline engine sprayers with a 200-gallon tank and developing a pressure of 150 to 250 pounds. Before 1925, four-horse-power gasoline engine sprayers were in use; these developed a pressure of 400 to 600 pounds and discharged twelve to fifteen gallons a minute through spray "guns," which displaced spray rods. Between 1925 and 1935, a number of stationary spray outfits were installed; in these the spray material, under pressure from a central power plant, was forced through the orchard in iron pipes and discharged through hose attached to connections at frequent intervals. By 1940, tractor-drawn "speed sprayers," which utilized an air blast to distribute the material, and "mast sprayers," which had several spray guns attached at intervals along a vertical steel tube three to fifteen feet high, were used in large orchards. These enveloped the whole tree in a spray fog without stopping the tractor. They effected a marked saving in labor but required more material to a tree. About 1915 the application of chemicals in the form of dust instead of liquid won some adherents, especially in the treatment of peach orchards, but most growers found spraying more efficient.

Spraying materials, like spraying equipment, have changed frequently. The major changes have been the substitution of arsenate of lead for Paris green, about 1896; the use of miscible (soluble) oils about 1905; the introduction of self-boiled lime-sulphur about 1907; the replacement of California wash by concentrated lime-sulphur and oil sprays about 1910; the substitution of dilute lime-sulphur for Bordeaux about 1914; the more general use of nicotine sulphate after 1910. Since 1930, numerous new spray materials, many of them proprietary, have superseded some of the standard sprays of only a few years before. The displacement of the spray calendar by the more accurate county spray service of Agricultural Extension dates from 1925.

About 1930, concern was expressed over the possible danger to the health of consumers from eating fresh fruit that carried a considerable quantity of arsenical spray residue, particularly from late summer applications of arsenate of lead to control codling moth. The federal government passed a law establishing the minimum amount of this material, or tolerance, which was considered safe. Brushing or washing attachments were added to grading machines; commonly the fruit was passed through a bath of dilute hydrochloric acid, then rinsed in clear water. Washing removed dirt as well as spray residue, so that the fruit was more attractive and salable.

In spite of the vigilance of State and federal quarantine officials, new pests have been imported from time to time. The first severe damage from Oriental fruit moth was in 1923. By 1925 it was a major orchard pest in the southeastern counties, and by 1929 it had spread throughout the State. Japanese beetle, which was first discovered in Pennsylvania in 1900, took heavy toll of orchards as well as lawns and ornamentals, although its spread was retarded by quarantine measures. The first infestation of gypsy moth in Pennsylvania was discovered in 1932; quarantine and control measures by Pennsylvania Department of Agriculture seem to promise the ultimate extermination of this pest. Inspection of peach orchards for yellows by that Department has reduced the incidence of the very virulent disease from eight per cent in 1920 to less than one per cent.

Insect pests and diseases are not the only predators in orchards. Protected game, mainly deer but including some bear, elk, and rabbits, take toll in certain seasons and certain localities. After 1910, the deer herds of the State increased so rapidly that in some districts they were a nuisance to farmers. In 1916 Chester J. Tyson stated, "From all parts of the State where farm lands and orchards join up closely with forests, and particularly with State reservations, we are having reports of serious damage to the crops and especially to apple trees. . . . Damage . . . amounting to five hundred up to several thousand dollars [have been] sustained by individual growers."[48] During severe winters herds of deer browsed hungrily on the succulent twigs of young orchards, killing or stunting the trees. In 1924 J. A. Runk of Huntingdon County reported, "I have had 4,250 trees actually lost by deer."[49] Many fields of vegetables and small grains, also, were ruined.

Fruit growers took the position that since protected game is the property of the State, the State should pay for damage to crops. In 1917 and again in 1919 the General Assembly considered but did not pass a law which would have established this policy. After 1923 the State paid for wire deer-proof fencing, provided the farmer bore the cost of posts and installation. Attempts to reduce the number of deer in congested areas by means of an occasional open doe season were not successful, mainly because of the opposition of local sportsmen.

In 1924 several court decisions established the right of farmers to kill deer actually seen damaging crops, provided the carcasses were turned over to the local game wardens. In July, 1925, the Game Commission issued an order permitting farmers in seventeen deer-congested counties and a few townships in other counties to kill deer whenever seen damaging crops. After 1930 the problem became less acute; fencing, an occasional local open doe season, and private killing of deer by farmers gave considerable relief. In 1932 the Game Commission estimated that "100,000 deer were killed in Pennsylvania during the December open season. Of these about 25,000 were bucks and 75,000 were does. . . . Authorities estimated that there were at least 1,000,000 deer in the woods of Pennsylvania last summer."[50]

In the easy-going fruit growing of colonial days every passer-by was welcome to help himself to fruit. Since 1900, some growers have suffered heavy loss from theft. Under the common law which applied prior to 1925, taking fruit from a wagon or truck was larceny but taking it from a tree was not. This absurd distinction remained in force until the issue was brought to a focus in 1925 by the theft of apples from a Berks County orchard. The guilt of the defendant was proved in court, but the presiding judge directed the jury to find a verdict for the defendant on the ground that the apples were attached to trees and the trees were attached to land; this being so, the apples were real estate, not personal property, and one could not steal real estate. Outraged by this legal hair-splitting, fruit growers appealed to the General Assembly, then in session. That body passed a law providing a fine of not to exceed $500, or imprisonment for not to exceed three years, for stealing fruit, flowers, shrubbery, and farm and garden crops. It had a salutary effect.

STANDARD GRADES AND PACKAGES

Until after 1900, there were no commonly accepted grades or packages; every fruit grower followed his own inclination in this respect. Ethical standards were far below those that prevail today. Packages of fruit were commonly "deaconed" by placing the poorest specimens at the bottom and the best on top. Some barrels of apples were "stovepiped"; a section of stovepipe was placed in the middle and filled with culls, then good fruit was filled in around it, after which the stovepipe was withdrawn.

The first public discussion of grades and grading was at the 1894 meeting of the State Horticultural Association. It was due, in large measure, to increasing competition from well-graded western fruit; Pennsylvania growers were forced to do better grading in order to hold their local markets. Little progress could be expected, however, as long as most of the shipped fruit was packed, not by growers, but by buyers. At the 1908 meeting of the Association a canvass revealed that only about one-third of the growers present packed their own apples; speculators bought crops on the trees and packed them according to their own preference. The practice of selling crops on the trees largely ceased after 1918, with a corresponding increase of interest in standard grades and packages.

Federal legislation on this subject was initiated with the passage of the Sulzer law, in 1912. This defined a standard barrel and a standard grade. A Pennsylvania apple-branding law, approved May 24, 1917, was a first step toward better packing. It provided that the face or shown surface of a closed package should fairly represent the contents and that the variety, minimum size or numerical count, and the name and address of the grower be marked on the outside of the package. In 1920 the United States standard grades were promulgated in this State for apples, and later for other fruits.

The next advance was shipping-point inspection, beginning in 1922. This governmental service, which was paid for by the shippers concerned, promoted the confidence between buyer and seller that is essential to successful merchandizing. In the shipping season 1933-1934 seventy-five per cent of the commercial apple crop of the State, seventy-five per cent of the commercial peach crop, and ninety-eight per cent of the commercial grape crop were certified for grade by the Pennsylvania Department of Agriculture.[51]

Standardization of packages has accompanied standardization of grades. Prior to 1900 the only way to determine the quantity of fruit in a barrel or other package was to measure it; quite commonly second-hand flour or sugar barrels were used; the variation in capacity might amount to nearly a bushel. The standard-barrel law was passed by Congress in 1915; the standard-container act, establishing standards for berry boxes, climax baskets, and till baskets, in 1916; and the Vestal law, which established standards for bushels and smaller packages, in 1928. Federal pure-food laws require that the contents of each package, or the numerical count of fruit, be stamped on it. Thus, within a quarter century, order came out of chaos in the grading and packaging of fruit.

After 1920, the trend toward small "consumer packages"—those which may be easily carried home from store, roadside market, or packing house—gathered momentum. The three-bushel barrel, long supreme among apple packages, was forced to abdicate in favor of the bushel basket, box, crate, and smaller packages.

CHANGES IN MARKETING METHODS

In the early days of commercial fruit growing the marketing process was very simple as compared with the present intricate procedure. The lack of large quantities of one variety by any grower was a handicap. In 1852, a Montgomery County farmer described the marketing methods of his time: "The course generally pursued in Pennsylvania has, with some exceptions, been different. Orchards contain many varieties of apples, some, little known beyond the neighborhood in which they originated—the fruit gathered (sometimes without proper care,) is put into bags and taken to Philadelphia in wagons, becoming more or less bruised in the transportation, and upon arriving there, it must be sold for consumption, because merchants will not . . . purchase it for shipping, on account of the difficulty of getting sufficient quantities of well-known and well reputed kinds; of the trouble of packing in casks; and of the injuries already received in bringing it to market."[52] After 1890, several types of middlemen—brokers, jobbers, commission men, retailers—were interposed between the grower and consumer in wholesale operations, but most Pennsylvania fruit continued to be sold by direct marketing.

By 1900 competition from the West and South had begun to pinch. Pacific coast apples, mostly from Hood River Valley, Oregon, began to appear in Pennsylvania cities in quantity about 1898; in 1902, Philadelphia received 262,000 boxes. After 1915, large quantities of Washington apples came into competition with home-grown fruit. The freight charge to Philadelphia was seventy-four cents a bushel in 1926 as compared with thirteen cents for Adams County apples; this differential helped Pennsylvania growers meet this competition. By 1925, California, Oregon, and Washington produced practically half the entire fruit crop of the nation. In 1940, the "peach season," which a generation earlier began in August with the ripening of the first home-grown varieties, had been extended to six months, beginning with the first consignments from the South in May.

After 1920, there was an amazing transformation in methods of transporting fruit. The motor truck revolutionized the industry. These modern draft horses of the highway opened new markets; they entered small towns and villages which formerly had been inadequately served with fruit, chiefly from local orchards. The motor truck brought upon the scene a new type of middleman—the truck peddler. He bought fruit from the grower or wholesaler and sold it anywhere in this or other states where he could find a market. His operations had a tendency to discourage good grading.

Improvements in transportation made it possible for fruits not produced in this State to compete with Pennsylvania apples, peaches, and grapes. Chief of these were the orange, grapefruit, and banana. Backed by well organized and well financed cooperative sales agencies, these fruits pushed their way into markets once occupied exclusively or chiefly by home-grown fruits. The banana trade with Central America grew from $1,820,000 in 1884 to $25,000,000 in 1930. Certain vegetables also, especially the cantaloupe, caught the fancy of consumers to such an extent that the demand for fruit was materially reduced. The *per capita* consumption of apples declined from two and a quarter bushels in 1885 to one and a half bushels in 1925.

The period from 1915 to 1940 witnessed the rise of cooperative packing and sometimes of cooperative marketing. The first central packing house in Pennsylvania was opened at Biglerville, Adams County, in 1915. By 1925, there were many such enterprises, especially in the southeastern counties. There was not as much incentive to cooperative marketing in Pennsylvania as in states where most of the crop must be wholesaled. In 1930, over eighty per cent of the commercial fruit crop was sold by direct marketing—at the farm, at roadside stands, peddled, or moved through one intermediary, the retailer.

After 1930, chain grocery stores and roadside markets became increasingly important outlets. By 1940, chain stores handled over one-quarter of the fruit and vegetables sold in Pennsylvania cities. These organizations operated their own produce warehouses, thus saving jobber and wholesaler commissions. After 1935, chain stores adopted the policy of buying from growers and shippers at country points, rather than from wholesalers, provided a sufficient quantity of well-graded produce could be secured.

Between 1890 and 1930, from ten to twenty per cent of the commercial apple crop of the State was exported. In 1926, fifty-five per cent of the wholesale shipments was to European and South American markets.[53] The intense economic nationalism which developed in Europe after World War I, our own nation setting the pace, as evidenced by embargoes, quotas, retaliatory tariffs, import licenses, compensation exports, preferential trade agreements, and the like, raised almost insurmountable barriers to foreign trade in fruit.

Prices received at the farm fluctuated from fifty-eight cents a bushel for apples in January, 1912, to $2.50 in January, 1922; and from eighty cents a bushel for peaches in September, 1915, to $3.45 in September, 1921.[54] "Appalachian Apples, Inc.," which was organized in 1936 by growers from Pennsylvania, Maryland, West Virginia, and Virginia, gave effective advertising to the product of this region; the cost was met by a contribution from cooperating growers of one-half cent a bushel for their crop of the current year.

PROCESSING, STORING, AND FORCING FRUIT

After 1900, cider and vinegar making on the farm declined to a mere fraction of its former importance; the factory and custom-made product was cheaper and more uniform in quality.

In 1897, the General Assembly enacted a law that vinegar offered for sale must contain not less than four per cent acetic acid. This aroused the farmers, since pure home-made cider vinegar seldom attains this standard. In 1901 the Legislature amended the law; no specific standard of acidity was required but water, chemicals, or acids could not be added. Vinegar-making on the farm, except for home use, practically ceased after 1910. The home drying of sliced fruits and vegetables, in the sun, by the stove, or in the dry-house, passed out after 1900. Home canning, likewise, began to dwindle after 1920; it was cheaper and less trouble for the urban housewife to buy the factory product. Many rural housewives, however, still numbered their jars of fruit by the hundred.

In 1815, Ezra Daggett and Thomas Kensett secured the first American patent on canning. Tin cans were very expensive and the process made little headway until the stamp can was invented in 1847. The first commercial pack of fruit in tins was in 1861. In 1876, a machine to shape and solder cans was exhibited at the Centennial Exposition; this was the real beginning of the canning industry. By 1880, machinery was available that did most of the processes of canning mechanically, even filling the cans and soldering the lids. Rolling on can tops without soldering them came about 1900. Until about 1890 there were periodic public attacks on canned goods; it was asserted that tin poisoned the food and that preservatives and coloring matter used were deleterious to health.

About 1885, Pennsylvania fruit and vegetable growers began to take advantage of this new outlet for their products. In that year the State Horticultural Association was informed, "Canning establishments have greatly multiplied. Canned fruits and vegetables are now so low in price that they are no longer regarded by the poorer classes as luxuries." In 1894 it was reported, "A canning establishment began operation here [Franklin County] this season, and had a capacity of about 1,000 bushels per day."[55] Soon other canneries were established, mainly in the southeastern counties, particularly in Adams, Franklin, York, and Erie. At first they utilized only windfall apples, but after 1920 entire crops were canned.

High quality in canned fruits was promoted by the establishment of grades for raw cannery products and inspection for grade by the Pennsylvania Department of Agriculture. In 1934, over 73,000,000 pounds were inspected, of which 41,000,000 pounds were apples. The production of fruits and vegetables specifically for canning increased rapidly after 1920. In 1925, canning crops netted farmers more than $20,000,000. The crops most commonly canned were tomatoes, snap beans, sweet corn, green peas, apples, and cherries. By 1940, many urban consumers who formerly had used fresh fruits and vegetables were relying largely on canned goods.

Commercial quick-freezing of vegetables and fruits, especially small fruits, began about 1920. By 1940, this process had become a competitor of canned goods. Improvements in mechanical refrigeration at home, especially deep-freeze cabinets, seemed destined to favor the rapid exploitation of the process. Quick-freezing extended the marketing season of certain fruits and vegetables from a limited period to the year around.

About 1850, there was much interest in the construction of common storage houses, mostly bank cellars. These were useful to growers who catered to local markets, but were unsatisfactory in wholesale marketing. Between 1860 and 1870, many insulated fruit houses were built with ice above the fruit. The patented "Nyce Fruit House" was of this type; in 1865, Thomas Meehan stated that Mr. Nyce and his friends were making fortunes out of the idea. A considerable number were erected in Pennsylvania, especially near Reading. The cost was about $2,000 for a house holding 4,000 bushels and requiring 100 tons of ice a year. The walls were insulated with sawdust. A few mechanical cold storage houses using ice-cooled brine as a refrigerant were built about 1890, but most growers depended on air-cooled cellars.

After the disastrous apple crop of 1896, when hundreds of thousands of bushels rotted on the ground, there was a quickening of interest in cold storage. Between 1900 and 1920, the quantity of fruit placed in cold storage tripled. At first such storages were located only in terminal markets and the space was controlled by speculators. After 1920, the number of grower-owned storages at or near points of production increased rapidly. The next development, about 1930, was the small, automatically-operated farm cold storage adapted to the use of the fruit grower with limited acreage. By 1940, this had superseded common storage on many farms, thus removing another element of uncertainty in the marketing of fruit and helping to stabilize the market.

The forcing of certain fruits under glass was profitable commercially in a limited way from 1840 to 1880, but it was mostly an avocation of the wealthy. Forced fruits were grown either in pots or in ground beds. Detailed directions for the care of the "orchard house" were given in horticultural magazines. In 1860, a correspondent of *Gardeners' Monthly* stated, "The cheapness with which glass-roofed sheds can now-a-days be constructed, will stimulate orchard house culture. . . . A cheap, rough, unpainted house of this description 30 feet long, by 13 wide can be built for $100. . . . Not more than five fruit . . . should be had from an 11 inch pot and 18 should be the maximum from a 14 inch. Nectarines readily command one dollar per doz."[56]

In 1876, it was reported, "From a single peach tree planted in a tub and kept in a hot house there have been sold in eighteen years no less than $2,300 worth of peaches, some of them at $36 per dozen, many at $24 to $28 per dozen and all at an average of $18 per dozen. They were sold mostly in the months of February and March."[57] The fruits most commonly grown in the orchard house were peaches, nectarines, apricots, apples, pears, figs, grapes, and strawberries. Pineapples were grown in pots quite extensively for the Philadelphia market as late as 1856: "At $5.00 each they pay." Forced strawberries often sold for $5.00 a quart in midwinter.

The fruit most commonly forced commercially near Philadelphia was the grape. European varieties, mainly Black Hamburg, were grown either in the cold grapery or with heat. In 1875, there were fifteen commercial graperies in Chester County. They were cheaply constructed lean-to houses fourteen to seventeen feet wide and 100 to 200 feet long. They were heated by a boiler but not piped; the smoke flue was carried the length of the house. Only the roof was of glass. Some vines produced thirty to forty pounds of grapes each; net profits of $700 a year were reported from houses 100 feet long. In 1863, Thomas Meehan said, "Few branches of gardening have grown so rapidly popular as grape-houses. They are not confined to 'men of means'. They have in some sort become a necessity to the multitude. They abound around our large cities; and if we travel into the wilderness we find them there."[58] The forcing of fruit ceased to be commercially profitable after 1880 when field-grown California and southern fruits began to reach Eastern markets in quantity.

SMALL FRUITS

Small fruits seldom were grown commercially until after 1850; the supply from the wild sufficed. The first small fruits to be grown commercially were the grape and the strawberry. The speculative fever in fruit growing developed in one of its most virulent forms in the culture of the grape. American viticulture began about 1830 on the banks of the Ohio at Cincinnati, under the expert guidance of Nicholas Longworth; the Ohio was known as "the Rhine of America." Grapes were grown mainly for wine-making.

There were several important centers of grape production in Pennsylvania, notably near York, Reading, and Pittsburgh. The dominant varieties were Isabella and Catawba. In 1857, the Pennsylvania Agricultural Society was informed, "The Catawba has been grown for wine, in this State, to a considerable extent in the neighborhood of Reading, where there are about two hundred and fifty acres devoted to its culture."[59] From Allegheny County came the report, in 1855, "Within the last two years, . . . between 40 and 50 acres have been planted in this immediate vicinity, chiefly the Catawba, on the hill-sides, facing the Alleghany, Monongahela and Ohio rivers. . . . The wine . . . is good and praiseworthy, and sells from $1 to $2 a gallon."[60]

The building of railroads and the consequent development of city markets revolutionized the grape industry. With the introduction of the Concord, in 1853, the culture of grapes primarily for wine-making gave way to their culture primarily for dessert. Fresh grapes sold for ten to fifteen cents a pound in Philadelphia. The Chautauqua-Erie grape belt, a narrow strip bordering Lake Erie, came into prominence about 1865. The next fifteen years were a nurseryman's paradise. In 1878, one of them recalled "the good old days": "Ten thousand Delawares would go in a box four feet square, and shipped by express C. O. D., would bring back $1,000 in a few days. . . . A man entered our office, and asked whether we would take $4,000 of Government bonds for five thousand Ionas. . . . We consented."[61]

The days of big profits in grape growing ceased about 1880, when California entered the market. Between 1880 and 1890, the grape acreage of the "Golden State" increased seven fold, from 35,000 to 213,000 acres, or more than the combined acreage in all the eastern states. Prices fell to a very modest level. In 1895, Erie County had 11,000 acres of grapes and shipped about 500 cars a year.

Another flush time in grape culture came after 1900. Between 1904 and 1916, Erie County expanded its vineyards with as much abandon as Adams County its apple orchards. By 1910, it was shipping 12,000 to 16,000 cars a year. After 1908, most of the carlot shipments were through a cooperative, which had representatives in the principal distributing centers in the East. During World War I, particularly after national prohibition went into effect, the optimism of Erie County grape growers was unbounded. The price jumped from $20-35 a ton to $75-125 a ton, only to fall again to $35 a ton after the fever had passed. The Keystone Cooperative Grape Growers' Association, organized in 1921, carried the industry from a condition of frequent chaos in the days of unorganized marketing to reasonable profits through organized packing and marketing. It sponsored the first compulsory grading law in Pennsylvania. By 1940, about four-fifths of the 5,000,000 grape vines in the State were in Erie County. Between 1930 and 1940, however, the number of vines of bearing age declined forty per cent.

Being practically an annual, the strawberry reacts strongly to the stimulus of good times; it is one of the most mercurial of fruits. Before 1900, "strawberry kings," with uneasy crowns, reigned briefly. Pennsylvania contributed one—John Knox of Pittsburgh. He was one of the most skilled cultivators of the strawberry and grape in America. Said the *Horticulturist,* in 1869, "Mr. Knox's name long since has become a household word throughout the country." From 1860 to 1872 his farm was the Mecca of horticulturists from every state in the East during his annual field days. He practiced very intensive strawberry culture and kept the plants in hills. His favorite variety was "Knox's 700," which turned out to be Jucunda.

The strawberries produced by John Knox were very large; commonly "5½ inches round, 16 to 24 fill a quart." Even Thomas Meehan, the usually conservative editor of *Gardeners' Monthly,* was moved to exclaim, "The size of his berries was the largest anyone ever saw; they might easily be mistaken for tomatoes. When I left Philadelphia strawberries were selling at ten cents a quart. His were being shipped to Boston, New York and all parts of the East for $1.00 a quart." *The Horticulturist* reported, "Rev. John Knox of Pittsburgh succeeded in making his land devoted to the Jucunda strawberry pay from $1,200 to $1,500 an acre. He frequently sold fancy berries at $1.00 a quart. These quart baskets often held but eighteen berries."[62] The intensive methods of strawberry culture of the present day do not differ materially from those practiced by John Knox about a century ago.

Thomas Meehan of Philadelphia was a central figure in the "strawberry war" which raged from 1851 to 1855. He asserted that the sexual characters of the strawberry blossom, particularly of the Hovey, were modified by cultural conditions. Nicholas Longworth of Cincinnati and William Prince of New York asserted that they were not. The battle of words waxed hot in horticultural journals. Time has justified the contention of Thomas Meehan.

Pennsylvania never has been prominent in the production of small fruits except of the grape in Erie County. Commercial plantings of strawberries, raspberries, blackberries, currants, and gooseberries never have totaled over 10,000 acres. The largest acreage was in Erie, Allegheny, Adams, Westmoreland, York, and Lancaster counties. The Sharpless strawberry, which was widely grown commercially throughout the East between 1880 and 1900, was originated by J. K. Sharpless of Catawissa. After 1925, it was possible to secure plants of raspberries and blackberries which were officially certified as free from the several virus diseases—the mosaics, leaf curl, and streak—which had greatly reduced the production of these fruits.

MINOR HORTICULTURAL CROPS

Commercial nut culture has made little headway in Pennsylvania, although a few groves of hardy northern pecans and English walnuts have been planted and some have yielded well. Prior to 1910, large quantities of chestnuts, black walnuts, and hickory nuts were gathered from the wild and sold; in 1909, more than 5,000,000 pounds were marketed. In 1892, S. B. Heiges of York County, observed, "Our county has long been noted for the superior quality of its shellbarks. . . . Our rich alluvial flats contain thousands and thousands of trees. . . . I have learned of one party who shipped twenty-five tons of *meats* (kernels), of another who sold 6,300 bushels."[63]

The abundance of chestnut in Pennsylvania woodlands was a source of pleasure and considerable profit; it was a valued timber tree, especially for making posts and rails, and the nuts fattened large numbers of swine running at large. After 1870, large quantities were gathered for sale. Between 1890 and 1910, there was much interest in the commercial production of chestnuts. Henry M. Engle of Marietta, Lancaster County, was first to embark upon this enterprise. He whip-grafted Paragon, Numbo, and other improved varieties on one-year old sprouts of native chestnut growing from stumps in cut-over land and necessarily irregularly spaced. These began to bear in three years. Others planted nursery-grafted trees in groves, regularly spaced. In 1895, it was noted, "Nut culture has taken a strong hold in Pennsylvania, especially the raising of improved varieties of chestnuts. With wild chestnuts selling at $4 to $5 a bushel, Paragon will generally sell at $6 to $8 a bushel. Paragon trees will yield twice as much as native trees of equal size."[64]

For a few years the new industry thrived. Stock companies were organized to exploit it. In 1898, it was reported, "The Albion Chestnut Co. sold their Alphas, the earliest variety for $14.00 per bushel in New York. The price falls as the season advances to $6 or $7."[65] C. K. Sober of Lewisburg developed an improved strain of Paragon called Sober Paragon. In 1907, he had nearly 100,000 young grafted trees on the hills above Shamokin.[66]

After 1915, the promising chestnut industry collapsed, the trees being victims of the imported chestnut bark disease or blight. This was first discovered in 1904 in New York City. By 1910, it had crossed the Delaware. In that year the State created a Chestnut Tree Blight Commission which attempted to establish a quarantine to prevent further westward spread and destroy spot infections beyond the quarantine. These efforts were fruitless; in 1916 it was evident that nothing could stay the onward sweep of the disease and that all native chestnut trees were doomed. By 1920, this once great resource—comprising more than 7,000,000 acres of forest on which more than one-fifth of the trees were chestnut—was gone. It is possible that, many years hence, some types of the immune Chinese chestnut may have repopulated Pennsylvania woodlands.

The production of silk usually is considered a horticultural enterprise since the mulberry tree on which silk worms feed is a product of the nursery. The calamitous collapse of the silk craze of 1826 to 1829—"the wildest speculation in American agriculture"—dampened but did not extinguish the ardor of silk enthusiasts. Another silk boom gathered headway during the decade following the Centennial Exposition. In 1877 sixty citizens petitioned the State Board of Agriculture and the General Assembly "to devise means for setting in operation the culture of raw silk in Pennsylvania."[67] At that time there were twenty-four silk mills in the State using imported raw silk. The State Board of Agriculture decided to sponsor the movement. In 1877, the Secretary of the Board stated unequivocally, "When properly conducted the production of silk may yield a result which will give greater profits than any other source now open to farmers. In the course of time many of our people may be driven to silk culture as a dire necessity."

In 1879, the outstanding silk exhibits at the Centennial Exposition were placed in the Permanent International Exposition. This venture soon was discontinued and the project was taken over by the Women's Silk Culture Association of Philadelphia. In 1880, this organization opened a school for silk culture in Philadelphia "to *provide a home industry* for women and children throughout the rural and agricultural districts," especially to the end "that citizens within fifty miles about Philadelphia and dwellers on the line of the Pennsylvania railroad, will be induced to engage practically in the culture."[68] In 1883 the State Board of Agriculture reported, "The last General Assembly of the State made an appropriation of seven thousand five hundred dollars per annum to foster seri-culture. . . . Beautiful specimens of silk reeled at the rooms of the Women's Silk Culture Association, [Philadelphia] . . . come from almost every county in the State; but the counties of Bucks, Montgomery, Chester, Lancaster, and Philadelphia lead in production. The results of the year have confirmed the experience of former years that as good, and in many cases, better silk is produced from worms fed exclusively on the Osage orange than from the best of mulberry."[69]

After 1885, the State-promoted silk project withered away; it never had any standing except among a few bemused enthusiasts. In 1886, the Committee on Silk Culture of the State Board of Agriculture confessed, "The advances made in the past in silk culture in Pennsylvania are so meager that no practical facts of encouragement can be given."[70] In 1887, only fifty-four pounds of cocoons were produced; rural people found that they could employ their time more profitably at other occupations.

MARKET GARDENING

In 1940, market gardening far exceeded fruit growing in commercial importance, but the literature of the subject was comparatively meager. Prior to 1840, vegetables were grown almost wholly for home use. Practically every family except in the larger cities raised its own supply. Potatoes, cabbage, turnips, carrots, and parsnips were stored for winter use in house cellars or in pits. In rural areas, particularly among German farmers, the "four-square" kitchen garden prevailed; it was laid out into small, raised beds with walks between them and was enclosed by a fence. Not until after 1900 did rectangular gardens for the more efficient use of horse-drawn implements become common. The garden was the domain of the farmer's wife almost as much as her kitchen; usually she did all the work in it except plowing, spading, and manuring. Most gardens contained only a few kinds of vegetables; half of the area was likely to be devoted to early potatoes and the remainder to lettuce, green onions, and cabbages, the onion bed being used later for celery. Only very limited plantings of peas, beans, squash, and other vegetables were made.

The rise of the tomato in favor after 1875 is one of the most remarkable developments in vegetable gardening; previously it had been considered poisonous by many. In 1872, the Philadelphia *Inquirer* stated, "The tomato was first cultivated in the vicinity of Philadelphia by Mr. Crenselet, a native of France, and retired merchant. . . . The tomatoes raised on his farm were distributed among the French residents of Philadelphia. . . . It was a long while before the tomato came into general use."[71] According to the *Lawrence Journal* of 1870, "The free use of tomatoes is condemned by Dr. Dio Lewis, as he is of the opinion that they cause bleeding of the gums, loosening of the teeth, and irritation of the membrane of the intestinal canal. . . . Dr. Lewis thinks a moderate quantity, perhaps a spoonful at a meal, may be very beneficial."[72] Not until after 1880 was prejudice against the tomato fully dissipated.

There was a little market gardening prior to 1840, mostly in the vicinity of Philadelphia and Pittsburgh, but the industry did not begin to assume any considerable importance until about 1850. The great increase in urban population resulting from the industrial revolution created city and town markets which had not existed before. Publication of Peter Henderson's *Gardening for Profit* in 1867 greatly stimulated interest in this phase of horticulture. From 1850 to 1875, market gardening was quite profitable near urban centers, which then were supplied almost wholly by local gardeners. The man who could bring in the first green onions, radishes, and lettuce in the spring, the first peas, beans, and cabbage in early summer and the first sweet corn, tomatoes, and lima beans in late summer could almost set his price. By 1890, this was changed; there was hardly a day of the year when all the common vegetables could not be bought in city markets, having been transported there in refrigerator cars from distant production centers.

About 1895, when wheat growing was unprofitable, some general farmers near towns began to grow potatoes, cabbages, sweet corn, and tomatoes for market. The census of 1900 revealed that on only 7,000 of the 224,000 farms of the State were vegetables the principle source of income. Aside from late potatoes, which usually are classified as a field rather than horticultural crop, vegetables with the largest acreage in 1900 were sweet corn, 12,000 acres; cabbage, 10,000 acres; tomatoes, 6,000 acres. In the Philadelphia area, Pennsylvania market gardeners had to meet the competition of New Jersey, Delaware, and Maryland growers, much of whose produce was brought to market in boats. Several hours might be required to haul a load of vegetables to the Dock Street or Callowhill Street market by team. Produce was delivered all during the night, but business was most active about daybreak. The congestion within the market area often was chaotic.

After 1900, commercial vegetable production increased rapidly. Sweet corn continued to be the leading crop; in 1916, there were 20,000 acres, or twice as much as any other vegetable. This was due largely to the demand of canneries. After 1915 the trend in cabbage, onion, and melon production was downward, but there was a marked increase in the production of asparagus, tomatoes, snap beans, lettuce, celery, and green peas.

Vegetable gardening has had none of the "boom and bust" periods that have afflicted fruit growing. The nearest approach to one was the excitement over fabulous profits to be expected in ginseng culture. Wrote the usually conservative George C. Butz in 1902, "Five years ago the seed was being sold at . . . $15.00 per pound. At this writing we have record of its being sold at the astounding price of $240.00 per pound. Five years ago the two-year old roots, grown under cultivation were sold at $50.00 per thousand. Now similar roots command a price of $150.00 and higher per thousand. . . . The estimate based upon our experiment that $15,000 could be cleared on one acre in five years time, is we think a very conservative estimate."[73] The Chinese, however, did not like cultivated ginseng as well as wild ginseng, and the flame of great expectations soon cooled into the ashes of disillusion.

There were few large market garden districts other than near Philadelphia and Pittsburgh, but every morning from late spring till late fall hundreds of wagons loaded with locally-grown asparagus, cabbage, tomatoes, celery, and other vegetables in season moved into Reading, Lancaster, York, McKeesport, Wilkes-Barre, Scranton, Erie, Harrisburg, Allentown, Sunbury, and other cities. Counties which led in vegetable production at that time were Philadelphia, Allegheny, Lancaster, York, Berks, Bucks, Montgomery, Erie, and Luzerne, all of which had good local markets. The most intensive market gardening district was in Philadelphia County, centering at Bustleton where a great variety of crops was grown, featuring celery, lettuce, rhubarb, carrots, and tomatoes.

The year 1917 saw the beginning of a great forward movement in vegetable production. This was due to the discovery of the important role of vitamins in nutrition, about 1910, and to World War I, which greatly stimulated public interest in vegetable production and use. In 1917 and 1918, thousands of urban and suburban families, in a blaze of patriotic fervor, responded to the appeal of the federal government to grow more vegetables and thus help release more wheat and meat for those directly engaged in the struggle in Europe. Boy Scouts sought to carry out their slogan, "Every Scout to feed a soldier." Few of the thousands of "war gardens" were an economic success; yet, in the aggregate, they were a commendable contribution to the war effort.

What was even more important, the demand for fresh vegetables thus stimulated carried over after the war-time need had passed, when the vacant city lots and waste land that had been used briefly as war gardens had reverted to weeds and neglect.

During the war years there was much home canning of fruits and vegetables; this helped to stimulate urban demand for the commercial canned product. After 1920, a rapidly increasing proportion of certain vegetables was marketed at canneries. In 1928, the proportion was:[74]

Consumed as Fresh Produce		*Canned*	
Asparagus	1,104,000 lbs.	Snap beans	4,400,000 lbs.
Cabbage	20,000,000 lbs.	Sweet corn	7,200,000 lbs.
Celery	3,550,000 lbs.	Peas	3,060,000 lbs.
Lettuce	540,000 lbs.	Tomatoes	37,800,000 lbs.
Onions	1,850,000 lbs.		
Tomatoes	3,480,000 lbs.		

After 1918, the tendency of different districts to specialize in the production of those vegetables that could be grown to best advantage was more in evidence. On the sandy soils of lower Bucks County near the Delaware River asparagus and spinach were the leading crops. In Philadelphia County, centering at Bustleton, head lettuce was grown extensively, commonly with overhead irrigation. From the limited areas of muck soil in northern counties, especially in Tioga, Erie, Wayne, and Susquehanna, many carloads of celery, cabbage, and onions were shipped. Tomatoes, sweet corn, and snap beans for canning were specialties in York, Lancaster, and Franklin counties. Northern Indiana County, southern Jefferson County, and south-central Erie County were important shipping points of late cabbage, mainly Danish Ballhead.

In 1940, there were four general types of vegetable production:

Market Gardening. This was the first type to develop, and comprised the largest acreage. It was conducted mainly on comparatively small farms, commonly from ten to forty acres, close to city and town markets. The most important centers of production were in the vicinity of Philadelphia, Pittsburgh, Erie, Wilkes-Barre, Reading, and Allentown. The census of 1940 designated two townships in lower Bucks County, two near Pittsburgh, and one near Wilkes-Barre as "vegetable townships," since seventy per cent or more of the farm income in these areas was derived from the sale of vegetables.

Truck Farming. This was vegetable production on a large scale; each farm might comprise several hundred, perhaps several thousand acres. Truck farming centered in lower Bucks County. The King Farms Company of Morrisville was a good example of this "factory" vegetable production. In 1940, it controlled 6,500 acres, of which 2,400 were in vegetables. On some days it had 1,000 hands in the field harvesting crops and 125 more in the packing house. In 1940, this company grew 1,300 acres of spinach and 1,000 acres of snap beans.

Canning Crops. The culture of vegetable crops specifically for the cannery was most common in York, Lancaster, Erie, Adams, Franklin, and Chester counties. Tomatoes, sweet corn, green peas, and snap beans were the principal crops. In 1925, York County had fifteen canneries.

Vegetable Forcing. This type of vegetable gardening was restricted to locations near large cities. Tomatoes and lettuce were the principal crops. The production of mushrooms was limited mainly to a highly specialized area in Chester County.

After 1920, the trend in the commercial production of vegetables for consumption while fresh was downward, save for cabbage, spinach, asparagus, lettuce, and snap beans, largely because of the increased use of the processed product. There was a marked increase in production for canning, so that the total acreage increased from 54,000 in 1920 to 88,000 in 1940. Practically all vegetables marketed while fresh were consumed within the State. In 1940, Pennsylvania was the leading state in the production of spring spinach. Of crops grown in 1940 for the fresh produce market, the most prominent were cabbage, 9,800 acres; spinach, 3,600 acres; asparagus, 3,200 acres; snap beans, 3,150 acres.[75] The acreage of onions and celery, which had been important crops a generation earlier, was comparatively insignificant.

CANNED, FROZEN, AND FORCED VEGETABLES

The most important development in Pennsylvania vegetable growing after 1920 was the remarkable expansion in the production of canning crops, from 7,500 acres in 1920 to 41,000 acres in 1940. Most of the acreage was in tomatoes, sweet corn, green peas, and snap beans. The industry was widely distributed throughout the State, but was most highly concentrated in York, Lancaster, Erie, Franklin, and Bucks counties. The fluctuating yearly acreage was largely under the control of packers who made annual contracts with growers before the season opened.

Commercial canning began about 1890, but a few canneries were operating ten or more years before. At the 1891 meeting of the State Horticultural Association it was stated, "The profit in raising corn, tomatoes, peas and beans for canning will undoubtedly stimulate a large production in 1891.[76] At that time sweet corn was by far the leading canning crop. After 1890, the H. J. Heinz Company, which was established near Pittsburgh in 1869, became an increasingly important factor in the vegetable canning industry of this and other states. In 1902 it planted 18,000 acres with its own seeds and gathered the products of many thousands of acres more.[77]

Practically half of the canning crop acreage in 1940 was tomatoes. Pennsylvania-grown tomatoes are especially well adapted for canning and for processing into juice, the demand for which increased tremendously after 1930. Cannery tomatoes became an important cash crop for many general farmers; they commonly grew from five to thirty acres to a farm. In 1935, the Pennsylvania Vegetable Growers' Association and the Agricultural Extension Service, jointly, began to award certificates to those who produced an average of ten tons of marketable tomatoes an acre on at least two acres; in 1939, seventy-eight "Ten-Ton Tomato Club" certificates were awarded.[78] Yields of more than twenty tons an acre have been reported.

Prior to 1936, purchase of tomato crops by canneries was at a flat rate, commonly $10 to $12 a ton delivered at the plant. In 1933 the Pennsylvania Department of Agriculture promulgated U. S. Standard Grades for cannery asparagus, tomatoes, sweet corn, and mushrooms; soon after, other vegetables were included. After 1936 canneries bought crops according to their grade, as determined by licensed inspectors. This was an incentive to better culture. Tomato plants for cannery crops commonly were field-grown in Florida and other southern states from seed certified to be disease-free. The leading canning varieties were Marglobe, Rutgers, and Pritchard.

Quick-freezing of vegetables, so that they could be packed, transported, and stored throughout the year without deterioration, began in 1931 when Clarence Birdseye sold his patent rights on the process to General Foods. By 1940, there were frozen food stores in all the larger cities and towns, and small deep-freeze lockers were being installed in homes. Not all vegetables can be quick-frozen satisfactorily; cabbage, tomatoes, celery, and cucumbers cannot; but asparagus, sweet corn, snap beans, broccoli, and many others can. Quick-freezing has profoundly affected methods of culture and the choice of varieties.

Before southern and Pacific coast produce came into Pennsylvania markets, beginning about 1885, a considerable quantity of vegetables was forced for sale out of the normal season. The introduction of hot-water heating of greenhouses about 1840, and later of steam heating, led to the erection of many vegetable-forcing structures near Philadelphia about 1860. These were mostly lean-to houses about twenty-five feet wide and twelve feet high at the back. Lettuce and cucumbers were the principal crops. More vegetables were forced in hot-beds and cold frames, however, than in greenhouses. In 1863, Mr. Edwin Satterthwaite of Jenkintown described his methods: "I have been in the practice for several years of forcing for market large quantities of Asparagus, Rhubarb, Lettuce, Radishes, Beets, Cauliflower, etc. These are all grown in hot-beds, made in the ordinary way. . . . We commence putting in beds in this way early in December and continue in succession till late in March. Asparagus put in in this way will be fit to cut in about two weeks, and we have it constantly from Christmas till it comes out of doors. The Asparagus roots, after cutting 5 or 6 weeks, will be nearly exhausted. . . . Lettuce and Radishes are very extensively grown for market in cold hot-beds. . . ."[79]

By 1880, "winter gardening" was an established industry near Philadelphia, especially in Chester County. Walter Styer of Concordville, Chester County, was one of the pioneers. In 1896 he stated, "The vegetables most commonly grown under glass are tomatoes, cucumbers, radishes and lettuce; beans, cress and parsley are not so largely grown but do well and are often profitable."[80] By 1920, there were fifty acres of greenhouse space in Pennsylvania devoted to the forcing of vegetables; the major centers of production were Kennett Square, Chester County; New Castle, Lawrence County; and Erie. In the vicinity of Philadelphia and Erie, forcing in frames continued, usually in connection with the production of vegetable plants for sale. By that time Grand Rapids leaf lettuce, commonly grown under glass, was meeting serious competition from field-grown head lettuce from California. After 1920 vegetable forcing, chiefly of tomatoes, continued to be an important enterprise; the high quality of the product enabled it to compete with the cheaper field-grown product from the South and West.

Mushroom culture, a highly specialized branch of vegetable forcing, developed rapidly after 1900, chiefly near Kennett Square, Chester County. This location was determined mainly by proximity to large eastern markets and because horse manure, the medium on which the crop was grown, was available in large quantity at Philadelphia livery stables. The industry started about 1885 in connection with the greenhouse culture of cut flowers. In 1896, Walter Styer of Concordville stated, "Mushrooms . . . are frequently grown . . . beneath [greenhouse] benches or occupying adjoining houses or cellars."[81] Soon thereafter commercial production of mushrooms was almost wholly in wooden houses, insulated and piped for low heat. They were grown in tiers of shallow beds of composted horse manure "cased" with soil. In Butler County some were grown in caves and abandoned coal mines.

The mushroom industry prospered. The price rose from eighteen cents a pound in 1895 to sixty cents a pound in 1905. By 1924, about eighty-five per cent of all the mushrooms produced in the country came from the Kennett Square area. In 1930, the investment in the industry in that area was over $12,000,000. In that season about 500 growers produced over 15,000,000 pounds valued at between $5,000,000 and $6,000,000.[82]

The chief hazard in the mushroom industry in early years was uncertain results from the use of imported brick spawn—the mycelium of the fungus, dried on manure. Some beds yielded well, others spawned with the same material did not. The use of pure-culture spawn in bottles, beginning about 1910, gave more reliable production. About 1930, J. W. Sinden of The Pennsylvania State College developed a spawn in which the mycelium was grown on cooked grain; this was cheaper and more dependable than other types of spawn. Another handicap was the dwindling supply of horse manure. By 1930, the displacement of horses by motors had proceeded to the point where it was difficult, if not impossible, to secure a sufficient supply. At this critical juncture the same investigator developed a satisfactory substitute—synthetic compost, commonly made of wheat straw and shredded corn fodder to which was added grain and certain chemicals, as urea, potassium chloride, ammonium nitrate, and calcium cyanide. Synthetic manure saved the day for the mushroom industry.

Changes in Methods of Production and Marketing

After 1900, vegetable growers experienced almost as radical changes in methods of production and marketing as fruit growers. One of the most significant was mechanization. The adoption of power equipment in market gardening was not as rapid as in other phases of crop production since it was more difficult to apply machine methods to advantage on a small acreage; but truck farmers quickly adopted mechanization. Prior to 1930 market gardening was largely laborious, back-breaking labor; thereafter most of the major operations—planting, cultivating, fertilizing, spraying, harvesting, and preparation for market—were performed efficiently by machines.

Until about 1930, most market gardeners felt that the tractor could not supplant the horse in the exacting operations of seeding and close-row cultivation and that it would injure crops by compacting the soil. The necessity of lowering the cost of production, however, brought about the early displacement of horses by tractors in truck farming and eventually in market gardening. Light-weight tractors came into use about 1935. A variety of specialized gardening attachments were developed for use with tractors, such as multiple-row seeders, plant setters, fertilizer side-dressers, sprayers, and dusters. Rubber tires greatly increased their usefulness in the vegetable garden. Tractors were equipped with lights so that at critical times work could be done at night.

Other applications of mechanization in vegetable gardening included overhead irrigation, which began to come into common use about 1915, especially for lettuce and spinach; various types of grading, washing, and packing equipment; and spraying and dusting machinery. With an eight-row tractor-drawn sprayer, five to six acres could be covered in an hour; with a twenty-four nozzle eight-row duster, ten acres; with an airplane duster, fifty to seventy-five acres.

Displacement of horses by motors brought about important changes in methods of maintaining soil fertility. Until about 1920, vegetable growers depended on stable manure almost exclusively. Market gardeners near cities kept one or more teams on the road continuously hauling manure from city livery stables. In some cases it could be secured without cost; usually, however, it cost twenty-five to fifty cents a two-horse load. Those at a distance from cities paid $1.75 to $2.00 a ton for street sweepings in carlots. Applications of fifteen to twenty-five tons an acre annually were common, sometimes fifty tons. After 1930, stable manure was so scarce and costly that its use in vegetable production practically ceased; gardeners were forced to rely on cover crops and green manuring crops to maintain the organic content of the soil and to apply commercial fertilizers more freely. After 1935, fertilizer placement was practiced generally; most of the fertilizer was applied several times during the growing season in a narrow band near the crop row.

Changes in commercial varieties have been rapid; better sorts appear constantly, displacing older varieties. The rough, deeply-wrinkled tomato of 1900, which had much waste in peeling, has given way to round, smooth fruits which have practically no waste. The "string beans" of 1900, with obnoxious strings that had to be removed before cooking, have been succeeded by "snap beans" which are almost completely free from this objectionable feature. Varieties of head lettuce suitable for field culture in Pennsylvania have been developed by plant breeders, largely displacing the long-popular leafy sorts. Varieties particularly adapted for specific uses, as for canning, have been developed. Disease-resistant sorts have given greater security to producers. Seed of certain crops, as tomatoes, may be certified by the Pennsylvania Department of Agriculture as free from disease.

At one time Pennsylvania was a center of vegetable seed production. In 1863, it was noted, "The Buists, of Philadelphia, . . . have, to our knowledge, 400 acres under seed crops, and, perhaps, indirectly, use from other growers near them the products of as many acres more."[83] In 1870, David Landreth and Sons of Philadelphia was the largest seed house in the United States; it had several hundred acres devoted to seed production in Bucks County. Since 1890 vegetable seeds have been grown in different parts of the country where each kind can be produced to best advantage, notably in California.

Changes in marketing procedure have been fully as marked as changes in cultural methods, partly because of changes in consumer buying habits and preferences. The house cellar as a suitable place to store winter vegetables has been largely eliminated. A majority of urban people now live in heated apartments or small homes with no storage facilities whatever except small refrigerators; a few have deep-freeze lockers. This condition has necessitated the use of small consumer packages and an increase in farm and cold storage.

Mass distribution of vegetables through chain stores began about 1920; it revolutionized marketing procedure. The development of "super-markets" on the self-service plan marked an epoch in retail distribution. By 1940 about half of all the vegetables consumed in urban areas were distributed through chain stores; thousands of corner grocery stores were put out of business.

General use of motor trucks, beginning about 1916, relegated the slow-moving market wagon to the junk pile. The outlet for fresh vegetables no longer was restricted to near-by towns; distant markets could be entered. Celery from Tioga County and cabbage from Erie County could be placed in all cities and towns of the State, and even in neighboring states, within a few hours. This facility, however, was a two-edged sword; it nullified a large part of the advantage that Pennsylvania growers had possessed in supplying their local markets. Said one harassed market gardener in 1935, "The enormous increase in motor-truck shipments in recent years has demoralized local markets. . . . Good roads and motor trucks have caused retailers of produce in the smaller cities and towns to go into the large city markets to buy the fresh vegetables they sell. . . . The great increase in the distribution of fresh vegetables by chain stores has concentrated their buying in large wholesale markets not accessible to the average grower."[84]

About 1935, chain stores began to buy produce direct from growers, provided a large quantity of well-graded vegetables could be secured at one point, especially from farmer cooperatives. One of the first of these was the Philadelphia Vegetable Growers' Cooperative Association, which was organized at Bustleton in 1921. Until 1937, this was concerned chiefly with cooperative buying; then it began cooperative sales. In 1925, the Penn's Manor Cooperative Association of Bucks County was making extensive use of motor trucks to haul asparagus to New York and Philadelphia. The Northeastern Vegetable and Potato Growers' Council, representing seven northeastern states, was organized in 1938; it served as a clearing house for the vegetable industry, particularly in the development of marketing policy.

FLORICULTURE

The vicinity of Philadelphia long has been a center of interest in floriculture, both commercial and amateur. In 1835, there were a number of small, flue-heated greenhouses with removable sash roofs devoted to the production of flowers for winter bouquets, chiefly camellias. A florist's wealth was determined mainly by the number of camellias he had; these retailed for a dollar each, sometimes for two to five dollars; yet they had no fragrance and no stem! In 1870, a Philadelphia florist reminisced, "We used to send thousands of camellias to New York, getting $5 per thousand, while roses went begging at one-tenth as much." Camellias arranged in bouquets of geometrical design were the rage. The period of formal design also was the heyday of artificial flowers. At the 1852 exhibition of the Pennsylvania Agricultural Society, five of the flower awards were for bouquets of artificial flowers, only two for natural cut flowers; no growing flowers were exhibited.[85]

The introduction of hot water heating in 1839 marked an epoch in greenhouse horticulture. Between 1840 and 1850, the industry expanded rapidly. Roses began to attract attention, especially hybrid tea varieties. Sash-roof houses were superseded by houses with fixed roofs and glass embedded in putty. By 1860, commercial floriculture near Philadelphia had assumed considerable proportions. Rare and exotic plants from all over the world were grown by imported English and Scottish gardeners in the greenhouses of the wealthy. It was a proud day for the Pennsylvania Horticultural Society when it was able to announce that the wonder of the vegetable kingdom, the far-famed *Victoria regia*, flowered on August 28, 1851, in the greenhouses of Caleb Cope—the first time it had flowered in the United States.[86]

By 1870, the day of the camellia and tuberose was past; roses, carnations, and chrysanthemums ruled the trade, and hand bouquets of formal design gave way to informal bouquets. The rose was "Queen of Flowers." The celebrated crimson variety, General Jacqueminot, was at the height of its popularity for greenhouse culture about 1880. It was a one-crop variety; in order to ensure a continuous supply, several houses, started at intervals of two weeks, were necessary. By 1900, American Beauty had supplanted General Jacqueminot in popular favor; in 1895, exceptionally fine blooms on stems four to six feet long sold for three to fifteen dollars each. Other popular varieties of that period were Marechal Niel, a yellow hybrid tea introduced in 1866; Bride (white), which appeared in 1885; and Bridesmaid (pink), which came on the market in 1892. Between 1880 and 1900, the chrysanthemum reigned at exhibitions of the Pennsylvania Horticultural Society. Other popular greenhouse flowers between 1880 and 1900 were the exquisitely fragrant Marie Louise violet, lily-of-the-valley, calla lily, mignonette, and sweet pea.

The publication in 1866 of the first authoritative book on greenhouse horticulture, *Practical Floriculture*, by Peter Henderson, greatly stimulated the industry. After 1880, light wooden-frame houses superseded the cumbersome structures of earlier years. By 1890 iron-frame houses were being built. The culture of decorative plants under glass, as distinct from that of cut flowers, began about 1890. One of the many "firsts" of Philadelphia was the introduction of the Easter lily. It was brought to America by a Philadelphia woman who had vacationed in Bermuda and who carried home two bulbs in 1879. At Easter, 1882, William K. Harris, a prominent Philadelphia florist, introduced it to the trade. Soon florists all over the country were clamoring for bulbs. Another popular flowering plant was the begonia, of several species. During the Christmas season of 1899, flowering begonias sold in Philadelphia for eight dollars a plant. After 1900, there was greatly increased demand for flowering plants, particularly cyclamen, azalea, poinsettia and Chinese primrose, and for decorative leafy plants, as Boston fern and smilax.

From 1875 until 1910, Chester County excelled in the production of carnations under glass; it was known as the "carnation belt" of the nation. In 1896, about "fifty establishments are devoted almost exclusively to the production of this one flower, . . . in the aggregate at least 350,000 square feet." They were raised "by a class of what may be termed farmer florists . . . men who have added the greenhouse to the other farm interests."[87] The Chester County Carnation Society was organized in 1892. Between 1888 and 1896, eighty-nine new varieties of carnations were originated by the florists of that county.[88] Philadelphia started the upward trend of prices for new carnations when the variety Helen Keller retailed in 1894 for $2.50 a dozen; prior to that time $1.00 a dozen was a high price, even for the most select.[89] The furor over new varieties reached a climax in 1900 when $30,000 was paid for the propagating rights of the Mrs. Thomas W. Lawson, blooms of which sold for $9.00 a dozen.

After 1900, greenhouses were larger, wider, and lighter in construction. More galvanized iron and steel was used, less wood, and larger glass. In 1902 there was erected near Bristol, Bucks County, a rose house 307 feet long and 54 feet wide. The plants were grown on the ground, not in benches, and much of the preparation of the soil before planting was done with horse-drawn implements. In 1907, Edwin Lonsdale stated that at North Wales, Montgomery County, was what was said to be the largest greenhouse in the world. It was over 500 feet long and 150 feet wide. It was devoted exclusively to the growing of the American Beauty rose and contained 45,000 plants. Montgomery County produced more of this variety than any other county in America. In 1900, nearly $9,000,000 was invested in floriculture in this county.[90] The census of 1900 recorded 8,811,000 square feet of glass devoted to floriculture in Pennsylvania. In 1940, the Philadelphia area had a greater concentration of greenhouse floriculture than any other similar area in America.

After 1880, the vicinity of Philadelphia became famous for the commercial production of cut flowers out of doors. In 1881, it was recorded, "Farmers in this country are discovering that there is money in growing flowers in large quantities to sell to the florists of the city. For years . . . Philadelphia and New York have been supplied with spikes of tuberoses from the vicinity of Marietta, Lancaster County. And now the growing of gladioli is engaging attention. One farmer set out an acre, from which he cut racemes of bloom to the value of five hundred dollars, besides disposing of thirteen thousand bulbs to seedsmen."[91] In later years the peony, phlox, aster, chrysanthemum, delphinium, sweet pea, and other hardy perennials and annuals were grown. These were sold at roadside stands or wholesaled in the city. A wholesale flower market was organized in Philadelphia in 1902.

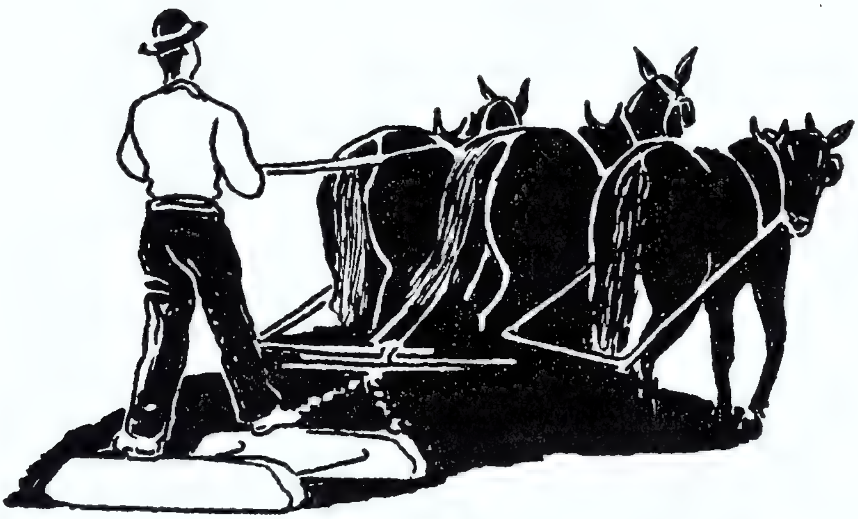
The first nursery in the Philadelphia area devoted exclusively to the production of ornamental trees and shrubs was established near Morrisville, Bucks County, by Mahlon Moon in 1849. The vicinity of Philadelphia has become the most intensive ornamental nursery district in the United States. In 1940, there were over 800 nurseries in Pennsylvania, mainly of ornamentals, aggregating 10,000 acres. Westgrove, Chester County, became noted for the number and quality of its rose plants; in 1907, it was claimed that a million were shipped to all parts of the world.

After 1870, ornamental gardening became more popular for both urban and rural homes. The introduction of the lawn mower, about 1855, made it possible for people of moderate means to maintain smooth lawns; previously this had been a privilege of the well-to-do. On home grounds, formal gardening was superseded by the natural style. The informal flower border succeeded the formal flower bed. Arbor day, which was first observed in 1886, stimulated interest in the embellishment of home grounds with shade trees. After 1870, the prejudice against having shade trees near the house, because it was thought that they favored "miasma," began to disappear. In 1864, the editor of *Gardners' Monthly* was warned, "Trees should never be planted so near a house as to allow the drip of its branches to fall upon it, or even to shade it much. . . . Close proximity of trees insures a damp unhealthy atmosphere. The grove or thicket should be at a little distance from the dwelling, to be resorted to in pleasant weather, for its cooling shade."[93] After 1870, the practice of planting home grounds with but one kind of shade tree gave way to mixed planting. The botanical gardens of John Evans of Radnor, Delaware County, were outstanding about 1860.

After 1900, many rural homes were as attractively planted with ornamentals as urban and suburban homes. As of old, however, the woman on the farm usually was responsible for whatever of home adornment was undertaken, especially with flowers. Her man was likely to feel that his time was too fully occupied with making a living for him to "fuss with flowers." But as time went by, more and more farmers were joined in spirit with the Scottish poet who sang:

> "The earth is fleck'd wi' flowers, mony tinted, fresh an' gay,
> And the birdies warble blithely, for my Faither made them sae."
>
> —MARY LEE DEMAREST, "My Ain Countrie."

XII



Split-log drag on Pennsylvania dirt roads, 1890

TRANSPORTATION AND MARKETING

CHANGES in methods of transporting and marketing farm produce since 1840 were fully as revolutionary as changes in cultural practice. This period saw the end of droving, the abandonment of canals, the rapid expansion of railroads, the advent of motor vehicles, the commercial exploitation of airplanes, and the development of a complex system of wholesale and retail merchandising far removed from the simple marketing processes of earlier years. Transportation of perishable farm products by fast freight, refrigerator cars, motor trucks, and air put them into Pennsylvania markets from points several hundred, even several thousand, miles away with as much ease as from points fifty miles away a generation earlier.

Expansion of Railroads

By 1860 railroads had demonstrated their superiority over other means of transportation, especially for long distances. Droving, which had been the prevailing method of getting livestock to market prior to 1840, dwindled away. The register of a tavern on the Lincoln Highway midway between Bedford and Everett, owned by the Mortimer family, records the close of this colorful chapter in Pennsylvania agriculture. Some of the last entries are:[1]

"April 25, 1847. Lewis Headlee, Greene County, Pa., with 126 fat cattle and 140 hogs."

"June 7, 1847, David W. Summers, Washington County, Pa., with 409 fat sheep for Philadelphia."

"May 9, 1850. James Matthews, Harrison County, Ohio, with 100 elephants [fat cattle], on the Slow Line, bound for New York."

"February 10, 1853. Alex. Critchfield, Somerset County, Pa., with ten horses bound for Boston, Mass."

The register of this tavern, like others of its type, was enlivened by the comments of its patrons. Harry Himmerling proclaimed himself to be "the Stoutest man on this Rode." Frederick Alle boasted that he was "the best checker plare in these Diggings." Many confided to the register that they feared they were "bound for a hard market."

The shriek of the locomotive, echoing and re-echoing from Pennsylvania hills, was the death knell of canals as well as of droving. The ambitious Pennsylvania Canal or State Works was built between 1826 and 1835 at a cost of $32,505,000. Its primary purpose was to compete with the Erie Canal for the trade of the West. It was not successful in this respect. In 1844 traffic from the central states passing over the Erie Canal was 350,000 tons; over the Pennsylvania Canal less than 75,000 tons. The local trade over the entire Pennsylvania Canal system, however, compared favorably with that of the New York system.

Incompetent management, graft, and pyramiding losses in operation, together with the obvious superiority of railroads, led to the sale of the State Works, beginning in 1843. By 1858 all of the system had been sold, mostly to the Pennsylvania Railroad, and the Canal Board abolished. Not the least of the many disadvantages of canal transportation was its slowness. In 1842 Charles Dickens traveled from Harrisburg to Pittsburgh by the Pennsylvania Canal. He left Harrisburg Friday afternoon and arrived at Pittsburgh Monday evening.

Railroad construction was most rapid between 1850 and 1875. The Pennsylvania Railroad was chartered April 13, 1846, and was authorized to construct a line between Harrisburg and Pittsburgh, with branches to Erie, Blairsville, and Uniontown. It was completed to Hollidaysburg in 1850 and to Pittsburgh on December 10, 1852, except for the mountain division, which was not opened until 1854. During this interval the company used the Portage Railroad of the Pennsylvania Canal in crossing the Alleghenies. It bought the main line of the Pennsylvania Canal in 1849, including the railroad between Philadelphia and Columbia. On July 18, 1858, the Pennsylvania Railroad ran the first through passenger train into Pittsburgh from Philadelphia.

Soon thereafter numerous short, independent lines were built in different parts of the State. Many of these were promoted by unscrupulous men who solicited subscriptions to stock, particularly from farmers who expected to be benefited by the operation of the line. Some farmers mortgaged their farms so as to be able to buy stock. Seldom did dividends come up to expectations; but the economy of transporting farm produce by rail, as compared to wagon or water transportation, was obvious. Rail transportation was available at all seasons, which was not true of other methods. For the first time, farmers had a year-around market.

Another great advantage of railroads was their time-saving. Perishable products, as milk, fruit, and vegetables, could be marketed to much greater advantage. Yet, in spite of these benefits, railroad construction was opposed by some farmers. They argued that trains would not only kill livestock—for the right of way was not fenced at that time—but also frighten horses on turnpikes that paralleled the lines and set fire to hay stacks and fields of ripened grain. It was claimed that a wood-burning locomotive spewed forth almost its own weight in live sparks every day. Old Farmers' Almanacs and some conservative farm journals made satirical remarks about "Hell in harness." This opposition soon broke down under the weight of proved advantages of railroads to farmers.

In 1854 Chief Justice J. S. Black commented, "A single steam engine now carries, at the rate of five hundred miles a day, the same quantity of farm produce which, forty years ago, it required seven hundred and fifty horses to haul, at the rate of fifteen miles a day."[2] In 1889 Andrew M. Frantz of Lancaster County voiced the general amazement of farmers of his generation at the wondrous things that had come to pass: "Old things have passed away and all things are become new. There was a time not fifty years ago, when the wheat and flour market in Philadelphia was in a great measure controlled by the Lancaster county crop. At that time it required six days and five or six horses to haul twenty barrels of flour to the Philadelphia market and return, distance sixty-eight miles. In the same time, one locomotive will haul 4,000 barrels from Chicago and return a distance of 1,000 miles. . . . One locomotive will do the hauling of 150 four-horse teams, in weight of loading, and in time will beat the horse team twenty to one. The cost per barrel to transport wheat or flour from Montana to Philadelphia now is not as much as it cost to haul it from Lancaster fifty years ago."[3]

All early railroads were single-track lines. There were no operation signals, no telegraph service, and no time schedules. After a train had stood on a siding for a prescribed length of time, waiting for a train running in the opposite direction to pass, it returned to the main track and "ran the curves"; a brakeman ran at least a quarter of a mile ahead of the train around every curve in order to flag down an oncoming train. Many curious rules governed pioneer railroading. In 1851 conductors on the Reading Railroad were instructed, "Do not let your brakeman throw pieces of coal at anyone passing on the road."

Improvements in rail transportation came rapidly. After 1845 the use of wood as fuel was abandoned gradually in favor of coal burning "tank cars"; no longer was it necessary to stop frequently to "wood up." Iron rails replaced wooden rails; by 1867 these were giving way to steel rails. In 1860 the Pennsylvania Railroad advertised itself as "the great double-track route." Gradually standard gauge track was adopted on all lines, but not without opposition in some quarters. About 1853 an attempt was made to standardize the gauge of railroads between New York and Chicago and thus eliminate the inconvenient and expensive transfer at Erie. This precipitated the "Erie War." Local draymen, hotel men, and merchants who had profited by the enforced stay-over of travelers fought the project. Bloody battles ensued; heads were broken, rails torn up, and bridges destroyed. For several months there was a six-mile gap between Harbor Creek and Erie which through passengers had to walk even in severe winter weather; this was known as "crossing the isthmus." Horace Greely fulminated, "Let Erie be avoided by all travelers until grass shall grow in her streets."

By 1870 there were 5,000 miles of railroad in Pennsylvania, penetrating almost every corner of the State. Farmers themselves built two short feeder lines when denied rail service by main line companies. In 1885, farmers near Fawn Grove, York County, raised $7,000 and built seven miles of road to the main line. In 1906, another neighborhood group in the same county built a nine-mile feeder. Each line had but one locomotive. Both ventures were successful.[4] Soon after 1870 many short lines were consolidated into trunk lines, thus avoiding vexatious delays in making connections and simplifying the assessment of freight charges.

In 1940 Pennsylvania had ninety-one railroads, of which eighteen were trunk lines, and about 11,000 miles of track. By then, however, the heyday of their prosperity has passed; the railroad problem was a matter of public concern. Only a few lines were paying satisfactory dividends; many were practically bankrupt. The primary cause of this situation was the relatively low average volume of traffic and revenue after 1930 because of increasing competition from other forms of transportation, particularly motor vehicles, but also including pipe lines and airplanes. High bonded indebtedness and the business depression also were important factors. In 1926 the railroads of the country handled seventy-five per cent of the ton-miles of inland freight;

in 1937, sixty-four per cent. Like the Conestoga wagons and canals which they had displaced, railroads were fighting for survival in a new order.

For many years Pennsylvania farmers were bitter against railroads because of preferential freight rates accorded to their competitors in western states. This issue was set forth in 1880 by M. C. Beebe: "Discrimination in the rate of freight in favor of the far-off, and against the near-by, has reversed a natural law intended by Providence to operate in our favor . . . The further you are from a market, the nearer you are in point of cost of transportation . . . The average cost of freighting a bushel of wheat from Chicago to New York is about ten cents. The farmer of Lancaster cannot get his wheat carried the paltry distance of one hundred and fifty miles, to the same market, or Philadelphia, even, for less . . . The average cost of freighting hay from the counties of Erie, Crawford, Mercer, and Venango, to Pittsburgh, is thirty dollars per car, while it is brought from the prairies of Illinois, across three States, to the same point, for the same amount, or less . . . A car load of Texas steers . . . will be hauled from Kansas City to New York for a less sum, absolutely, than the same line of railroad will charge for hauling a carload of Pennsylvania cattle from Greenville to Altoona . . . Our seeming advantage of being near a market is no advantage at all, but, on the contrary, a decided disadvantage."[5]

For several years thereafter the freight rate situation grew worse instead of better. According to the Hon. Gerard C. Brown, in 1886, the railroads were carrying grain from Chicago to New York for eighty cents a ton less than the freight from Lancaster County to New York. In other words, the rate on grain from western elevators to the seaboard was two mills a ton mile, while the farmers of southeastern Pennsylvania were compelled to pay two cents a ton mile.[6]

Not until farmers brought about the appointment of the Interstate Commerce Commission, on February 4, 1887, were the most glaring inequities of "the long and short haul" corrected. That some persisted is evidenced by the freight rates on potatoes to Philadelphia in 1925, although many costs are not associated with the distance shipped.[7]

From Caribou, Maine	60 cents per hundred
From Cadillac, Michigan	58 cents per hundred
From Waupaca, Wisconsin	65 cents per hundred
From Somerset, Pennsylvania	31 cents per hundred
From Stewartstown, Pennsylvania	22 cents per hundred

POOR ROADS, 1840-1900

Save for a few turnpikes built by private interests, the period from 1840 to 1900 was one of almost utter stagnation in road improvement. There was no State or federal aid, and roads were worked by statute labor under inefficient supervision. No real progress could be expected as long as responsibility for their building and upkeep rested with small local governmental subdivisions. Lack of good roads was due not only to archaic road laws but also to the rapid development of railroads. After this new form of transportation had proved its worth, the building of new turnpikes practically ceased. Existing turnpikes were neglected; many became so full of chuck-holes that it was dangerous to travel on them. There was, moreover, little public appreciation of the economic and social advantages of good roads.

The farm wagons that traveled these execrable roads were described by William J. McKnight: "The Pennsylvania wagon was wide tracked, and had wooden axles with iron skeins on the spindles. The tongue was stiff, and reached about three feet ahead of the horses. The horses were hitched to these wagons by iron trace- and long tongue-chains. In rough roads I used to think every time the tongue would strike a horse on the leg it would break it. Old horses understood this and would spread out to avoid these leg-blows . . . Every wagon carried its own tar on the coupling-pole under the hind axle . . . These old wagons would screech fearfully if they were not kept properly lubricated with this tar."[8] Between 1840 and 1870 the vicinity of Gettysburg was a center of the wagon-making industry. Here the Studebaker family, later automobile manufacturers, made famous wagons. In 1870 there were over 1400 carriage and wagon makers in Pennsylvania.

Prior to 1900 less than five per cent of the over 80,000 miles of roads could be classed as even "fair," and none of these was in a rural district. The road law of June 13, 1836, was still in force in 1890. Under it justices of county courts were empowered to appoint road supervisors, who usually were farmers, for each township. The supervisors could levy and collect taxes up to two mills of the assessed valuation. Citizens could work out their road taxes at the rate of $1.50 a day. Usually the road work was a farce; it was done whenever most convenient for the farmer to take time off from his farm, not when the roads needed attention most. The supervisor who was least exacting was popular among his fellow taxpayers and most likely to be reappointed. Road-making equipment was supplied by farmers—wagons, plows, stone-boats, picks and shovels. Not until May 24, 1887, did the General Assembly authorize road supervisors to purchase "plows, scrapers, road machines and such other implements," using for this purpose not to exceed twenty-five per cent of the road tax.[9] Only local road-making material was used.

The disastrous results of this hap-hazard method of road making were all too obvious. Said John J. Moore of Quakertown, Bucks County, in 1888, "How many of us can remember the long strings of farmers' wagons that came every springtime, as regularly as the migrations of the birds, with sideboards six inches high, loaded with about a half perch of stones gathered off some field two or three miles distant, and dumping them into some mud hole made the previous winter, and thus forming the nucleus of two more the next spring, one at each end of the stone pile, to be filled in like manner the next year."[10]

Between 1846 and 1856 there was much enthusiasm for plank roads. It was thought that these combined cheapness and efficiency. Roads of two-inch planks laid loosely on stringers could be built for $1,000 to $1,500 a mile. The General Assembly chartered about 300 plank turnpike companies, stock in which was eagerly subscribed. They were a disappointment. Although the first cost was low, depreciation was high. Heavy traffic broke or loosened the planks and they rotted quickly. By 1860 most plank roads had been abandoned.

The bicycle craze of 1880 to 1890 directed public attention to the need for better roads. The European high-wheel bicycle was first exhibited in America at the Centennial Exposition in 1876. After the American safety bicycle was introduced, in 1885, everybody who could afford it bought one. Country roads as well as city streets swarmed with them, particularly on Sunday. It was the height of the ambition of many a youth to make a "century run"—travel 100 miles in one day. Bicycle enthusiasts were not much concerned about the rights of other users of roads and so encountered the hostility of farmers. It became necessary to enact a law (April 23, 1889) defining the respective rights of the cyclists.[11] Bicyclists clamored for better roads, but since most of them were urban dwellers and did not have to pay for road improvements themselves, little progress was made.

About 1890 a nation-wide movement for better roads got under way. In that year prizes amounting to $700 were offered by a committee of Pennsylvania citizens, through the University of Pennsylvania, for the best essays on road making and maintenance. The National Good Roads Association was organized in 1892 with branches in each state. In 1893 the federal government established the Office of Road Inquiry. The most effective force for creating public sentiment for good roads in this State, however, was the Farmers' Institute. "How to Improve Our Roads" was discussed vehemently at hundreds of these rural gatherings. Farmers, the element in the body politic most concerned, began to demand a fundamental change in road policy. In 1889 N. F. Underwood stated, "Road-making ought to be considered as a separate and distinct business, not one to be mixed up with and subordinated to all the other kinds of business . . . The sum . . . wasted in this manner, with little visible improvement, would . . . go far toward macadamizing every mile of public road in the State."[12]

John Hamilton of Centre County, Director of Farmers' Institutes and later Secretary of Agriculture of Pennsylvania, was the most influential advocate of a better system of road management. He spoke persuasively on this subject at Farmers' Institutes from one end of the State to the other. In 1896 he declared our farmers were annually expending more than $3,500,000 in the repair of 80,000 miles of road, which, at the end of the year were in no better condition than at its beginning.[13] He introduced into the General Assembly the Hamilton Road Bill; this provided for an appropriation of $1,000,000 to be distributed among townships in proportion to their road mileage. It was passed on June 30, 1897, but no appropriation was made to carry out its provisions.

In 1899 John Hamilton stated, "The Legislature of 1899 provided for the appointment of a Road Commission . . . to frame a bill for presentation to the next Legislature . . . [Its report] will, undoubtedly, provide for two fundamental things, viz, competent supervision and State aid . . . The farmers cannot, and ought not to be expected to build these roads unassisted by the other industries of the State."[14] In 1900 less than five per cent of the roads had a hard surface; practically all farmers were still "in the mud."

BUILDING GOOD ROADS, 1900-1940

The Hamilton Road Bill of 1897 and the report of the Road Commission to the General Assembly in 1899 bore fruit, ultimately, in the Sproul-Roberts Act of April 15, 1903. This legislation was the beginning of good roads in Pennsylvania. It created a Department of Public Highways with a commissioner in charge and appropriated $6,500,000 to be expended over a period of six years, to be distributed among counties and townships in proportion to their road mileage. Most of this fund was used to build sixty-four short, object-lesson macadam roads. Thus the policy of State aid in road building was re-established after a lapse of sixty years.

When requested by local road commissioners, the Department was required to make plans for the construction of all main highways in a district, establish standards therefor, and supervise their construction. Two thirds of the cost was borne by the State and one third by the local government. By act of May 3, 1905, the apportionment of cost was changed to three-fourths by the State, and it was stipulated that only durable roads, as macadam, were to be built with State-aid funds. In 1905 the General Assembly required all persons operating motor vehicles to pay a license fee which was to be used for road construction and maintenance.

After 1900 the automobile was the most potent factor in creating public sentiment for better roads. When Henry Ford introduced his famous low-priced Model T in 1902, he set in motion a force that revolutionized country life. For a number of years the automobile was a plaything of well-to-do city and town people and the detestation of farmers. One embittered farmer asserted, "Many a good horse is standing in the barn because of the use of the automobile. I would be in favor of making the roads so rough that a man with an automobile could not get over it."[15]

In 1907 the Committee on Roads of the State Board of Agriculture reported, "It is a fact that during the last two summers our old men, our wives and our daughters have been deprived of the use of public roads . . . Farmers are taxed heavily to keep the roads in good condition . . . [but] are practically driven away by locomotives or rubber-tired wheels driven by careless and incompetent hands. We believe the auto is with us to stay and we recommend that a tax be placed upon it that will be felt in the construction and maintenance of our roads . . . By the swift-moving wheels of the automobile the dust and small stones are lifted and thrown from the surface of the road, leaving it bare, rough and in need of repairs.[16] After 1910 farmers began to use automobiles more generally, and soon added their voices to the swelling chorus demanding better roads.

The next great forward step was the Sproul Road Act of May 31, 1911. Senator William C. Sproul, who later served as Governor, has been called "the father of good roads in Pennsylvania." This Act reorganized the State Highway Department and greatly extended State aid. Under it the State took over 8,855 miles of main highways connecting the principal cities, towns, and county seats and assumed responsibility for their reconstruction with "durable material," and for their maintenance. Provision was made for the purchase by the State of all toll roads that were part of this State highway system; at that time there were 717 miles of toll roads, mostly in the southeastern counties. The last toll road was freed in 1922.

The Sproul Road Act of 1911 provided for a complete survey of all the roads of the State; this survey is the basis on which the present State highway system is built. To meet the objections of farmers that State aid had been devoted almost wholly to building costly macadam roads between urban centers, the Jones Earth Road Act of June 14, 1911, was passed. This provided for State aid in the construction of township dirt roads built under the supervision of the State Highway Department.

The complaint of farmers that State aid was expended mainly to facilitate urban, not rural, traffic was justified. In 1909 the State Highway Department admitted, "Since the organization of the Highway Department in 1904, . . . not more than one thousand miles of roads has been reconstructed . . . and as it is estimated that there is more than ninety thousand miles of roads in the State, we cannot hope to see in our day and generation a very large percentage of the roads reconstructed . . . It is upon the dirt road that we must largely depend to market our products of the farm. How to improve the dirt road is the vital road question for us to-day."[17] Thereupon the Department began to encourage county road authorities to use the split log drag, which was invented by D. Ward King of Missouri. When used properly and frequently it effected marked improvement. In 1913 the State used 1,500 such drags on the 9,000 miles of State highway that were of earth construction. In addition, many thousands, mostly home-made, were in use throughout the State. In 1914 Lycoming County operated 400 road drag patrols.

Pennsylvania farmers are conservative; experience through many generations has taught them to be so. Especially are they reluctant to go into debt, even for such a worthy cause as good roads. At the Annual Normal Institute of the State Board of Agriculture held on May 20-23, 1913, this resolution was adopted: "Whereas, Real estate is paying more than its just proportion of taxes and it is proposed to still farther encumber the State with a loan of fifty million dollars for the construction of roads . . .

And, whereas, . . . Notwithstanding the condition of our highways . . the farmers have been successful in marketing all their products . . . Therefore, be it Resolved: That we are unalterably opposed to encumber future generations with a debt that is unnecessary and uncalled for at this time"[18] The State Grange passed a similar resolution and favored the adoption of a pay-as-you-go policy. The bond issue submitted to the electorate in 1913 was not approved, but subsequent issues in 1918, 1923 and 1933, each for $50,000,000, were approved.

Until about 1920 many farmers preferred dirt roads. They objected to bituminous macadam because it was "so smooth that horses have no foothold and are unable to draw half the loads that they could before the roads were improved." In 1914, when only 3,472 of the 87,386 miles of road were improved, it was argued, "It will be many years before even the main highways are permanently constructed, and that, for a generation at least, most of the highways . . . will remain . . . dirt roads. It has been amply demonstrated that these dirt highways can be made excellent roads eight months in the year and passable the other four months," provided they have proper drainage and sufficient crown to shed water, and that the road drag is used regularly.[19] In 1914 the Editor of *Pennsylvania Farmer* raised the question, "Do we need good roads for farmers in the modern interpretation of good roads, or roads good for the every-day needs of the farmers? The high-priced, smooth-surfaced roads giving the ideal conditions for automobile travel are not suitable to the practical needs of the farmers . . . The greatest and most immediate need is in the improvement of our earth roads."[20] This editor reflected the majority sentiment of his farmer constituency at that time. He could not have been expected to foresee that, within a decade, farmers would be using automobiles and trucks as freely as urban people and would be fully as vocal in demanding hard-surface roads.

The good-roads movement was greatly advanced by the Act of 1913 requiring that all money derived from licenses of motor vehicles be sequestered for the exclusive use of the State Highway Department; previously it had gone into the general fund. This made possible better maintenance of State highways. Public interest in road improvement was at its height between 1912 and 1918. In 1914 Washington County had a Good Roads Day; more than 1,000 men, mostly farmers, turned out to work on county roads, without pay, and others made liberal cash contributions. Washington and Jefferson College closed for the day in order that all students might participate. The first State-wide Good Roads Day was designated by Governor Martin Brumbaugh in 1915; it brought out 78,000 men and 11,000 teams. Over 5,000 miles of dirt roads were improved. On a similar occasion in 1916 over 100,000 men reported.

FEDERAL AND STATE AID IN ROAD IMPROVEMENT

Federal aid in the improvement of Pennsylvania roads was initiated by Act of Congress on July 11, 1916— "To provide that the United States shall aid the States in the construction of rural post-roads and for other purposes." Under this Act Pennsylvania received $230,644 in 1917, this sum to be multiplied by two, three, four, and five respectively during the succeeding four years. Federal aid was to be matched by state appropriations for this purpose. In 1921 federal aid amounted to $3,459,000; it increased greatly thereafter. By Act of Congress in 1921 a federal highway system was established, to include not more than seven per cent of the total mileage of any state. Under this program the State received several million dollars annually.

After 1917 road improvement, mainly with bituminous macadam and concrete, proceeded rapidly. During the administration of Governor William C. Sproul (1919-1923) over $120,000,000 was expended for this purpose; during the administration of Governor John D. Fisher (1927-1931), in excess of $235,000,000. The money was derived from bond issues, motor and operator licenses, a gasoline tax, federal aid, and local taxes. Under the Sproul-Sadler Act of 1919 all roads were classified as primary or secondary; the State assumed responsibility for the reconstruction and upkeep of primary roads, the counties and townships for secondary roads. In 1929 the State assumed responsibility for all borough streets that are part of State highway routes, and for county bridges on such routes. By 1930 the State was responsible for the maintenance of 13,500 miles of highway.

Notwithstanding marked progress in improving main highways, most farmers still lived and hauled their produce to market on dirt roads. In 1930 the types of roads on which farmers lived were:[21]

Kind of Road	*Number of Farmers*	*Per Cent*
Concrete	15,595	9.1
Macadam and asphalt	22,473	13.0
Gravel	14,684	8.5
Improved dirt	21,367	12.4
Unimproved dirt	91,241	52.9
All other	7,049	4.1
	172,419	100.0

By 1930 the State had completed the improvement of most of the main routes, on which farmers constituted only about five per cent of the traffic. Farmers continued to urge that more attention be given to the improvement of township roads. In 1931 Gifford Pinchot campaigned for Governor on this issue, "Take the farmers out of the mud." He won. During the first year of his administration over 1,500 miles of township dirt roads were lightly surfaced with bituminous material at a cost of $5,000 a mile as compared to $40,000 a mile on primary roads. By Act of Assembly the State assumed responsibility for about 20,000 miles of township roads in addition to the 13,500 miles then in the State highway system. This action gave much needed tax relief to farmers; according to an investigation by Fred P. Weaver in 1930, farmers were furnishing about seventeen per cent of the traffic on township roads, but were paying thirty-six per cent of the cost of maintaining them.[22] By 1940 there were 18,314 miles of these "Pinchot roads."

The most ambitious highway project of this period was the Pennsylvania Turnpike or Superhighway. The Pennsylvania Turnpike Commission was appointed by Governor George Earle in 1937 and was authorized to build an all-weather highway between Harrisburg and Pittsburgh with State and federal funds. The federal funds were supplied by the Public Works Administration and the Reconstruction Finance Corporation. The cost was $70,000,000. Work was begun October 27, 1938; the highway was opened for traffic October 1, 1940. The Pennsylvania Turnpike has a 200-foot right of way, two concrete traffic lanes each way, and a maximum grade of three per cent. It shortens the road distance between Harrisburg and Pittsburgh eighty miles, as compared with other routes, and more than two hours in time because there is no cross traffic. It was planned to be a self-liquidating project, construction costs and maintenance to be financed by revenue from tolls.

After 1930 it became evident that the main highways were being pounded to pieces by heavy commercial trucks, many of which were owned by firms and corporations of other states. This led to more durable concrete and macadam construction, higher license fees, and legislative action limiting the weight of truck loads.

In 1919 enhancing the scenic beauty of roadsides was begun under the Sproul-Sadler Act, by the planting of ornamentals. Many city people desired avenue planting of shade trees along rural highways. Farmers objected to this not only because it would interfere with telephone and electric wires and cause roads to dry out slower but also because tree roots would take heavy toll of crops in adjacent fields. Unsightly billboards on private land adjacent to the highway continued to disfigure the rural landscape in spite of the efforts of the Pennsylvania Roadside Improvement Association to secure legislative action for their removal.

MOTOR TRANSPORTATION

Before the advent of good roads and motor vehicles, the rural electric trolley had its brief day in the sun. Inter-urban lines radiated from centers of population into the countryside, especially in southeastern and southwestern counties. For a time it was thought that trolleys would become a major means of transportation in rural as well as urban districts. In 1906 a sanguine York County farmer predicted, "The trolley has come to our farms and it has come to stay. It will circle our valleys and climb our hills. The steam railroad never can be brought to our farms."

Few trolley lines carried freight and express as well as passengers. In 1902 the State Board of Agriculture instructed its legislative committee to present a bill to the General Assembly "empowering trolley roads to carry merchandise and freight of all kinds." Two years later the State Grange introduced a bill requiring rural trolleys to carry freight. This bill was defeated. In 1907 it was re-introduced and passed, but with the nullifying amendment that it be optional with the companies whether they carried freight. Practically all chose not to do so. In 1924 eight trolley lines, aggregating 170 miles, radiated from Lancaster to different parts of the county. Thereafter motor buses gradually displaced trolleys, in spite of the protests of trolley companies before the Public Service Commission that this competition was unfair to them. Thus had pack-horse drivers protested the competition of wagoners; thus had wagoners, in turn, protested the competition of railroads; and thus do railroads, in our day, protest the competition of motor trucks, as the old order gives place to the new.

A "steam wagon" appeared in America in 1825, but the automobile age dates from May 8, 1879, when George A. Selden applied for a patent on a self-propelling vehicle; this was not granted until 1895. Meanwhile Henry Ford developed the first practicable automobile in 1893, and R. E. Olds in 1896. Both were "one lungers." By 1897 a few motor vehicles were used in Philadelphia for delivery, mainly by retail florists. In 1902 Henry Ford, seeking to develop a light, efficient, and comparatively inexpensive car adapted for mass production, put his Model T on the market. It was an immediate success. He sold over 15,000,000 of this model before discontinuing its production in 1928. For many years it was priced around $550 "complete with equipment."

No mechanical invention in history, not even the grain harvester, so profoundly influenced farming as the automobile. Hardly a phase of rural life was untouched. The automobile took country people to the city and city people to the country; it urbanized rural life. It removed rural isolation and provincialism and widened the intellectual and social horizon of farmers and their families. Even the broken arms or wrists, which sometimes resulted from hand cranking the "flivver," and the clincher tires which might require repairing several times in a hundred-mile trip, did not dim the enthusiasm of rural people for this new means of transportation. In 1913 the editor of *National Stockman and Farmer* asserted "More automobiles are now owned in the country than in the city . . . The automobile itself has furnished all the argument farmers need to convince them of its usefulness in the country. Today an automobile on the farm excites no more comment than a horse does."[23] By 1915 farmers' automobile tours, usually conducted by the recently-organized county Agricultural Extension Service, were a popular form of rural diversion and education. The World War I period greatly stimulated farm use of automobiles, trucks, and tractors, as an economic asset. In 1922 sixty-five per cent of Pennsylvania farmers owned automobiles; by 1940, more than ninety per cent.

Pennsylvania farmers, with their short hauls to local markets, profited more by the use of motor trucks than any other group of producers. Motor trucks were first used in considerable number in 1915, but mostly by transportation companies rather than by individual farmers. During 1917 and 1918, while World War I was in progress, many rural motor truck lines were established. These transported produce and supplies to and from farms, especially milk and other perishable products. Their routes were from twenty to 300 miles long. Many farmers who produced only two or three cans of milk found it more economical to pay hauling charges than to do the hauling themselves. Neighborhood groups of farmers bought and operated trucks cooperatively. In 1919 the Penn's Manor Cooperative Association of Bucks County marketed asparagus in Philadelphia and New York in fleets of motor trucks.

After 1918, aided by high post-war prices for farm products, many individual farmers bought trucks. In 1920 there were 10,000 on Pennsylvania farms, more than in any other state. Only Old Order Amish and Old Order Mennonite farmers, who were prohibited by church discipline from using motor vehicles, refrained from taking advantage of this rapid and efficient means of transportation. By 1925 the motor truck was a potential rival of the freight car, especially for short hauls of perishable products, which comprise the bulk of Pennsylvania farm produce. In that year Pennsylvania apple growers moved seventy-five per cent of their crop to market by truck. In 1935 ninety-five per cent of the total volume of farm produce which passed through the wholesale market of Reading arrived by truck.

The railroads became concerned about this competition and sought to meet it by absorption. In June, 1926, the Public Service Commission approved an application for a charter for a proposed motor bus and truck company, organized as a subsidiary of the Pennsylvania Railroad. Said *Pennsylvania Farmer,* "This action did not attract much attention but it really meant a great change in regard to highway transportation. In short, steam railroads have followed the example of some electric railways and turned to the highways to hold business in passengers and less than carload lots of freight. Branch railroads not proving profitable will be abandoned and the bus and truck lines spreading out over state will be feeders for the main lines. The Pennsylvania Railroad plans to operate in 54 counties."[24] Soon thereafter, however, farmers bought motor trucks and carried their produce to market themselves.

After 1930 trucks were used to put produce into distant as well as local markets. With improvement in highways, hauls of several hundred miles became practicable. Pennsylvania farmers found that they were within trucking range of 30,000,000 consumers, two thirds of whom lived in adjacent states. Pennsylvania apples were trucked to Florida and Florida oranges to Pennsylvania. Eventually the range of motor truck transportation became continental.

By 1940 the pioneer experiments in aviation of Samuel P. Langley and Orville and Wilbur Wright, in 1903, had developed into dependable airplane transportation, by both individuals and by chartered commercial companies. The use of this new method of transportation was not confined to passenger traffic. Trial shipments of perishable products, mainly fruit, vegetables and flowers, were made in 1928. By 1940 air transport of produce gave promise of being commercially feasible for certain commodities. A few years later the "Flying Farmers," a group of Pennsylvania farmers who piloted their own planes, was organized.

THE SHIFT TO COMMERCIAL FARMING

In 1840 many Pennsylvania farmers had not completed the process of changing from self-sufficing to commercial farming. In 1841 Henry Coleman of Massachusetts, one of the most respected farm leaders of his time, still clung to the old order. Said he, "It must be considered an established principle in domestic economy that every farmer should look to his farm for all his farm can furnish. Though it may seem better to sell his wool and buy his bread, yet in all such cases he pays a double commission—to the purchaser of the wool and to the seller of the bread, both of whom must get their living out of the operation."[25] Some farmers found it difficult to adjust themselves to the radically changed conditions resulting from the industrial revolution. They were handicapped by lack of business experience, lack of capital, and imperfect credit and marketing facilities. The habits and traditions of self-sufficing farming persisted in some quarters long after this system had been outmoded.

The transition from a tiller of the soil to a business man necessitated fundamental changes in the farmer. The business farmer is a capitalist on a small scale, an employer and manager of labor. Only when the farm is small is he primarily a laborer. He keeps one eye on the farm and the other on the market. He listens to the radio for market news and prices. He keeps farm accounts and inventories. To be successful, he must be trained in the techniques of science as applied to farming.

Increasing competition necessitated radical readjustments in methods of farm management. America is a land of free enterprise. One producer competes with another and may either drive him from the market or be himself driven. This competition, though sometimes ruthless in certain respects, sharpens wits and lowers costs. It eliminates the weak and unfit. Excellent potatoes and apples may be produced commercially in Pennsylvania; yet in 1934 over 2,200 cars of Maine potatoes were shipped to Pittsburgh alone, and 880 cars of Washington apples. In 1928 the metropolis of Philadelphia drew on forty-two states and eleven foreign countries for its supply of fresh fruits and vegetables. Of 44,215 cars received during the year, not including the large volume of produce trucked in from near-by points, California shipped 11,604 cars.[26] Soon after 1840 it became evident that Pennsyvlania farmers would have to specialize in the production of certain perishable commodities, as milk, eggs, fruits, and vegetables, and that general farm crops, with the exception of wheat, could be marketed to best advantage through livestock.

The rapid increase in total and in urban population accelerated the shift from self-sufficing to commercial farming. In 1840 Pennsylvania had a population of 1,724,000; in 1860, this had increased to 2,906,000, and in 1890 to 5,258,000. By 1940 there were 9,900,000 mouths to feed in the Keystone State and there were 355 cities and towns of more than 2,500 population—nearly twice as many local markets as in any other state. By 1930, however, it became evident that population increase was slowing down; between 1930 and 1940 it was less than three per cent as compared to ten per cent between 1920 and 1930, and thirty-three per cent between 1840 and 1850. This was due to a declining birth rate and to sharply restricted immigration. Experts predicted that by 1960 Pennsylvania would have a stationary population.

In 1870 Pennsylvania reached a turning point in its economic life—for the first time there were more urban dwellers than farmers. This trend accelerated until in 1900 only fourteen per cent of the population was agricultural, and by 1940 less than ten per cent. The "rural population," as reported by the United States census, is much larger since it includes all towns of less than 2,500 people, most of whom are industrial, not agricultural, workers. After 1870 Pennsylvania farms produced less food than her population required. This did not indicate that her agriculture was decadent, for in our present highly complex civilization no one state can expect to be a complete economic unit; but it did serve to emphasize the industrialization of a State that, for two centuries, had been overwhelmingly agricultural.

DIRECT MARKETING

As urbanization progressed, farmers marketed a constantly increasing proportion of their produce directly to consumers. In 1927 it was estimated that, on an average, the products of Pennsylvania farms were grown within seventy-five miles of their consuming markets.[27] Net returns to producers, especially on perishable products, often are higher when they are marketed directly to consumers or through but one middleman, the retailer, than when they move through the usual wholesale channels.

The simplest, and often the most profitable, method of direct marketing is by sales at the farm. This method has been used most by producers of milk, fruit, vegetables, eggs, potatoes, and poultry. "Pennsylvania producers who retail their products directly to consumers," said *Pennsylvania Farm Economics,* in 1940, "are less affected by fluctuations in the level of prices than are Pennsylvania producers who sell the same products at wholesale . . . During the past 30 years there has been a gradual widening of the spread between the prices received for milk retailed by farmers and for milk sold by farmers at wholesale."[28] A study of egg marketing by F. F. Lininger in 1927 revealed, "Farmers selling direct to consumers received the highest prices throughout the year—12 cents above country store prices, 11 cents above huckster prices, and 8 cents above New York wholesaler prices."[29]

After 1920 farm roadside markets or stands sprang up all over the State. Most of these sold only the products of the farms on which they were located; a few handled the products of neighbors, also. Some were quite elaborate and did business throughout the year; they were, in effect, retail stores. Most of them, however, were simple, inexpensive structures and were seasonal in operation. In 1940 Pennsylvania led in the number of these "front gate markets."

From 1912 until 1920 there was considerable interest in direct marketing by parcel post and express, especially fruit and vegetables. It soon was discovered, however, that the cost and hazards of transportation, unsuitable packages, difficulty in establishing credit relations, and lack of direct contact between seller and buyer made this method impracticable in most cases. Sales at the farm or by mail or express require time; the enhanced price is by no means clear profit.

For nearly three centuries market houses with stalls that are rented to farmers have been an important factor in the distribution of farm produce. Philadelphia pioneered in this respect in 1710. A farmers' market 114 feet long and thirty feet wide was built in 1861 on Market Street between Eleventh and Twelfth streets. It was erected by farmers of Chester and Delaware counties at a cost of $250,000. In 1870 it was stated, "Philadelphia has for generations been noted for the excellence of its market system . . . On Wednesdays and Saturdays . . . thousands of pounds of butter, poultry, meat and sausages are sold to consumers by farmers from Delaware, Chester, and all the counties within thirty miles of the city. Their butter-tubs are larger and handsomer, the balls are fairer and more golden, than are to be seen in any other city."[30]

South Second Street Market, Philadelphia, built in 1745

Farmers' markets were patronized by consumers most generally prior to 1900. Most of them were built with private capital, some by municipalities. They were most successful in communities where a large proportion of the people were Pennsylvania Germans and had been accustomed since childhood to "go to market." It was no uncommon sight in these communities to see a Judge of the State Supreme Court and his wife and other equally eminent citizens walking home from market carrying baskets of produce on their arms. Usually prices in market houses were not appreciably below those charged by retail stores, but the produce was fresher and in greater variety. Market houses were mostly a facility for the general farmer who had a considerable variety of products, each in small quantity, rather than for the specialist who produced a large quantity of one commodity. In 1933 Pennsylvania had seventy enclosed farmers' markets and sixty-two open-air or curb markets doing a business of $55,000,000 annually.

Curb markets were most common in Pennsylvania German communities. When on a street, the curb was marked off into spaces just wide enough to accommodate a wagon. In some cases the city supplied the space without charge; in others a nominal daily charge was made. In inclement weather there was no protection to either people or produce, hence most curb markets operated only from May to October. Consumers came to the Lancaster curb market from as far away as Philadelphia. It was discontinued in 1927 because of traffic congestion; a market house was built to succeed it.

After 1935 supermarkets established by chain store organizations drew many customers away from curb markets and market houses. About 1938 farmers near Scranton, Pittsburgh, and other cities cooperated in establishing wholesale open-air night markets at which they sold produce to retailers.

House-to-house sales by producers began to dwindle after 1925, except for milk. The truck peddler or huckster, who made it a business, largely took over this method of merchandising.

WHOLESALE MARKETING

When farmers consumed on the farm ninety per cent or more of all they produced, there was little need of wholesale marketing machinery; with the development of commercial farming this became imperative. It became necessary for many farmers to relinquish the function of distribution and to concentrate on the function of production. This was particularly true of producers of perishable products. The displacement of a concentrated, storable product, as butter and cheese, by a bulky, perishable product, as market milk, necessitated the development of a marketing system far more complex than that which had prevailed prior to 1840, because of the many services to be performed.

The functions of the middleman vary with the commodity; customs of the trade and the varying requirements of different products prescribe methods and channels of distribution. Producers of milk, fruit, potatoes, vegetables, and poultry have been particularly aggressive in developing efficient methods of marketing. In general, grains and forage crops, except wheat, are marketed through livestock. Wheat is marketed at a local elevator located on a railroad; from there it is shipped to a terminal or central market where it is bought by flour mills, stock feed manufacturers, and other users. Prior to 1840 Philadelphia was the most important terminal market for wheat and was the flour-milling center of the nation. Thereafter Minneapolis, Chicago, and other western cities took the lead.

Philadelphia and Pittsburgh are the great wholesale distributing centers of the State. From these cities produce goes by rail or truck to smaller cities and towns within within their trading and transportation range, which may extend 200 or more miles. For the convenience of their patrons, railroads have erected large warehouses at metropolitan terminals; auctions and private sales of perishable produce may be held in these markets. Dock and Callowhill streets, Philadelphia, have been used by wholesale receivers of fruits and vegetables since 1860.

The motor truck revolutionized wholesale as well as retail marketing. Many farmers were enabled to by-pass railroads and wholesalers and sell their produce to retailers as well as to consumers. By 1935 all Pennsylvania farmers were within easy trucking distance of the more than 50,000 food stores of the State. At first the movement of produce by truck had a tendency to confuse the market, as compared with the time when most of the produce arrived by rail; dealers never knew how much produce would be brought into the city on a given day. In 1940 the sale of perishable produce through commission men still was the most important wholesale outlet, but the volume of their trade was diminishing steadily.

For many years farmers felt that middlemen, as a class, exacted an exorbitant commission and that many were dishonest. It seemed to them that the spread between the price that the consumer paid and the price that the producer received was excessive. Between 1900 and 1920, especially, much was said about the "thirty-five-cent dollar." It was claimed that on every dollar paid by consumers for food products, sixty-five cents was taken for transportation and by middlemen, and that the farmer received only thirty-five cents. After an investigation of retail prices in Pennsylvania cities in 1909, the State Secretary of Agriculture reported, "In one of the cities of this State fifty per cent. is charged over and above the cost to the dealer and in several cities from twenty-eight to forty-seven per cent. above the cost is charged by butchers and dealers in meats."[31]

Undoubtedly there were some dishonest or avaricious middlemen, but most of them made a reasonable charge for the services rendered and the risks taken. On January 1, 1938, the Bonding and Licensing Act passed by the General Assembly of 1937 became effective. Under it individuals or firms that handle and sell farm produce for others must be licensed and give bond to protect their patrons from loss due to dishonest practice or neglect. A farmer who thinks that he has been defrauded may request the Pennsylvania Department of Agriculture, which enforces the law, to bring suit and collect damages.

From time to time attempts have been made by producers to "eliminate the middleman." Usually this has been done without full recognition of the fact that the middleman performs certain necessary services of distribution and that if the producer does these himself it involves the expenditure of considerable time and money. In 1874 the National Grange proposed to dispense with the middleman in the purchase of farm supplies: "We desire to bring producers and consumers, farmers and manufacturers into the most direct and friendly relations possible. Hence we must dispense with a surplus of middlemen, not that we are unfriendly to them, but we do not need them. Their surplus and their exactions diminish our profits."[32] Little was accomplished in this direction.

At a meeting of the Pennsylvania State Grange in December, 1917, a committee was appointed to meet with a similar committee of the Pennsylvania Federation of Labor. The combined group adopted a "statement of principles" of which the following is a part:

"We recommend to the organizations here represented the establishment of a joint working alliance.

"We recommend . . . a plan for the supply of agricultural products direct from the farmer to the consumer."[33]

This proposal experienced an early demise. Middlemen continue to perform a necessary function.

After 1920 chain stores played a vital role in the marketing system. In the period 1914-1917, the Great Atlantic and Pacific Tea Company, the pioneer organization of this kind, opened 2,200 retail stores throughout the nation. In 1927 it had 16,000 stores and did a business of over half a billion dollars.[34] Other chain store organizations came into being. By 1940 about two-thirds of the retail sales of food were made by these leviathans of merchandising. They put many privately-owned retail food stores out of business and greatly reduced the volume of trade handled by wholesalers.

For a number of years Pennsylvania farmers were critical of chain stores and marketed little produce through them. In 1935 the General Assembly considered a bill that would have imposed a graduated tax on each store in a chain. Said the editor of *Pennsylvania Farmer,* "Practically every member representing a rural area . . . voted for this tax measure. In doing so he reflected a feeling of antagonism toward chain stores that is rather widespread among Pennsylvania farmers. This feeling has developed because of certain methods used by the 'chain stores.' Using certain farm products, as milk, potatoes, etc., as 'leaders' was one of them. Another is the present practice of buying potatoes, vegetables and fruits from out of state sources when such products are seeking an outlet in the community where stores are located."[35] In 1937, however, when a bill was introduced imposing a graduated tax up to $500 on each of the 3,786 chain stores in the State, farmers opposed it. They had learned that chain stores had come to stay and that they could be one of the best outlets for certain farm products.

The reason why chain stores did not, at first, buy produce from local producers was because they could not get a large quantity of uniform grade. After 1935 farm cooperatives and some large individual producers began to meet this requirement. In March, 1935, the Lebanon County Potato Growers' Association contracted with a chain store organization to supply 10,000 bushels of U. S. No. 1 potatoes. In October, 1935, the same cooperative offered to contract to supply 1,000 bushels of potatoes a week until the following April. Chain stores then began to erect warehouses in important production centers; from these, as well as from warehouses in the larger cities, produce was distributed to their retail stores.

Before 1900 the export market was an important outlet for the products of Pennsylvania farms, mainly wheat, beef, pork, and apples. After World War I it fell off sharply, chiefly because of trade barriers erected by this and other nations in a futile attempt to become completely self-sufficing nationally. Prior to 1920 about a third of the commercial apple crop of the State, in some seasons, was exported. As late as 1890 considerable Pennsylvania wheat was exported and there was much concern about competition from Argentina, India, and Russia in foreign markets. After 1920 the market for Pennsylvania farm produce was almost wholly domestic, but the price of wheat, wool, and some other commodities still was strongly influenced by world markets—unless controlled by government action.

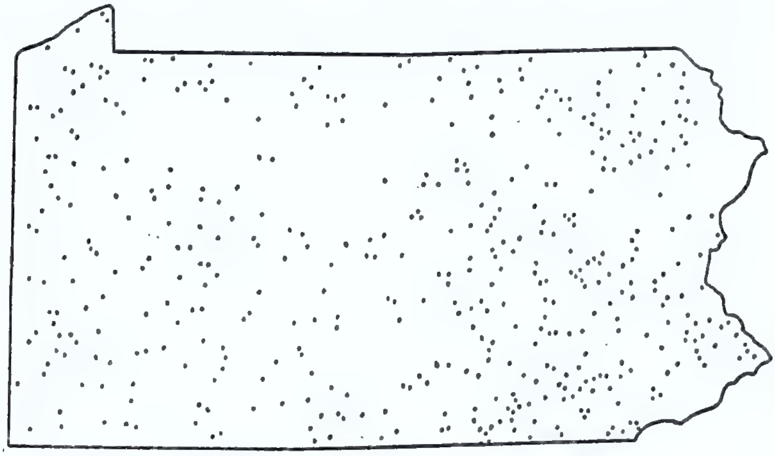
Governmental regulation of the marketing of certain farm products was initiated during the national emergency of World War I. It became an apparently permanent feature of the economy during the depression years that followed. The profound impact of this policy on Pennsylvania agriculture is considered in Chapter 14.

Chemurgy—the use of certain farm products for industrial purposes rather than for food—was a negligible factor in this State before 1940. Corn and soy beans, the crops most commonly grown in other states for industrial uses, are more valuable here when marketed through livestock than at the factory. Practically no Pennsylvania grain was converted into alcohol for use as automobile and tractor fuel; no corn was manufactured into paper, paste, and oils for textiles; no soy beans were converted into plastics, enamels, and substitutes for linseed oil in paints; the casein in no skimmed milk was used to make synthetic wool, paints, or paper coating.

The National Chemurgic Council, which was organized in 1935, was sanguine as to the future of chemurgy. In 1937 its secretary prophesied that within ten years more than 50,000,000 acres would be required for this purpose, and 150,000,000 acres within a generation. At that time one great manufacturer of chemical products was using annually the crops of 4,000,000 acres, and one large automobile manufacturer was using annually the crops of 2,406,000 acres, the hides of 138,000 cattle, and the wool of 3,698,000 sheep. Under the federal Farm Act of 1938 the sum of $4,000,000 was appropriated to establish four regional research laboratories for the development of new industrial uses and outlets for farm products. One of these was established at Philadelphia. It is possible that, at some time in the future, many farms will be operated as factories for the production of raw materials for industry, but it seems likely that few, if any, of these will be in Pennsylvania. Food, not raw materials for industry, probably will continue to be the goal of Pennsylvania agriculture.

FARM COOPERATIVES

An outstanding development of this period, mainly since 1920, was the rise of farm cooperatives. By habit and conviction farmers are individualists. They believe in and practice the philosophy of self-reliance. After 1880, however, they found themselves more and more at a disadvantage in an economic order which favored "big business" and in which collectivism was paramount. As a matter of self-interest they resorted to organized cooperative effort. By 1940 the



Distribution points of farmers' purchasing cooperatives in Pennsylvania, 1943 transition from individual action to group action had made marked headway, not only in the purchase of supplies and the marketing of farm products, but also in insurance, credit, communication (telephone), and other fields. Only Old Order Amish and Old Order Mennonites refrained from affiliating with cooperatives, because this would require them to sign a contract, which is contrary to their religious conviction.

There was much informal neighborhood cooperation, even before 1840; but organized cooperative effort among farmers began in 1864, when a cheese factory was established at Springville, Susquehanna County, and, soon after, others at Bridgewater, Gage, New Milford, and Spring Hill.[36] Many of the numerous cheese factories and creameries which sprang up thereafter, especially between 1870 and 1900, were of the cooperative type. In 1871 the Farmers' Institute of Eastern Pennsylvania considered a proposal to form "cooperative leagues among farmers, for making sales of produce, purchasing implements and fertilizers, and to procure fair rates of transportation."[37] Nothing came of this proposal.

The earliest record of a purchasing cooperative in Pennsylvania was in 1875, when the State Grange established a business office in Philadelphia which acted as purchasing agent for Pomona and Subordinate granges. In its first year it did a business of $130,000. This activity has continued to the present time; it now is represented by the Keystone Grange Exchange.

A number of other attempts at cooperative buying and selling were made before 1920, but most of them were short-lived. In 1906 the Lancaster County Farmers' Association, a purchasing cooperative, was organized. In 1911 it had 1,000 members and did a business of $122,000.[38] In 1915 E. B. Dorsett was "Farm Advisor on Cooperation in Marketing" of the Pennsylvania Department of Agriculture. It was his duty to assist farm organizations in the State, particularly the Grange, Farmers' Union, American Society of Equity, and neighborhood farmers' clubs, in the purchase of supplies and the sale of products. In 1915, "He supplied approximately 3,000 tons of fertilizer and fertilizer chemicals at an average saving to the farmer of $5.00 per ton, 40 tons of binder twine at a saving of 2½ cents per pound, 2,000 tons of feed at a saving of $4.00 per ton. . . . About 100 carloads of potatoes were sold which yielded the farmer from ten to fifteen cents per bushel more than he could have got at his local market, 100 cars of hay and straw . . . at from $2.00 to $4.00 per ton more than he could have realized by selling to the local dealer."[39] Similar activities continued in 1916.[40]

The prolonged economic depression that followed World War I stimulated interest in cooperatives. Between 1919 and 1923, forty-nine county or community purchasing cooperatives were incorporated.

In 1921 an overhead organization, the Pennsylvania Farmers' Cooperative Federation, was set up to pool the buying power of local cooperatives. This suspended business in 1925. About 1923 many local purchasing cooperatives in the northern counties began to secure supplies through the Cooperative Grange League Federation Exchange of New York, which was organized in 1920. In 1926 local purchasing cooperatives in other parts of the State began to buy through the Eastern States Farmers' Exchange, which was organized in 1918. In 1934 a third regional purchasing cooperative, the Pennsylvania Farm Bureau Cooperative Association, began to do business. By 1940 these three regional organizations and their affiliates handled eighty per cent of the farm supplies purchased cooperatively.

In addition to purchasing cooperatives, a number of marketing cooperatives were organized during the early post-war period. Most of these functioned on a one-commodity basis—milk, fruit, potatoes, eggs, wool. Among these were the Potter County Cooperative Potato Association, organized in 1920; the Keystone Cooperative Grape Company, organized in 1921; and the Philadelphia Vegetable Growers' Association, organized in 1921. All engaged in cooperative purchasing of supplies as well as marketing. A large proportion of the milk produced by Pennsylvania farmers was handled through the Interstate Milk Producers Association, a bargaining cooperative organized in 1916 and covering the Philadelphia milkshed; the Dairymens' Cooperative Sales Association, a bargaining cooperative organized in 1916 and covering the Pittsburgh milkshed; and the Dairymen's League Cooperative Association of New York, a bargaining and operating cooperative organized in 1907 and covering that part of the New York City milkshed that is in Pennsylvania.

The first egg-marketing cooperative in Pennsylvania was the Doylestown Egg Auction, which began operations on July 13, 1931, under the auspices of the Bucks County Producers' Cooperative Association. It had eighteen charter members with 27,000 laying hens. The success of this venture was so marked that similar enterprises were established at Center Point, Butler, Coatesville, and several other points. In 1936 the Pennsylvania Potato Growers' Association, an educational organization established in 1917, changed its name to Pennsylvania Cooperative Potato Growers' Association and began to merchandise this product.

In 1925 there were 113 farm cooperatives chartered under the Act of 1919, and 177 locals of the Dairymen's League Cooperative Association in this State. In addition, the Interstate Milk Producers Association, The Dairymen's Sales Cooperative Association, the Atlantic Coast Poultry Producers' Association of New York, the Cooperative Grange League Federation Exchange of Ithaca, N. Y., and approximately thirty local capital stock companies, including the Keystone Grange

Exchange, transacted a very large volume of business. In that year, 1925, the 113 independent farm cooperatives did a business of $35,009,680 and had a membership of 41,990, or approximately one farmer out of five. Cooperative sales of commodities that year amounted to $29,029,518 for milk and milk products, $1,105,824 for fruit and vegetables, and $220,594 for other products. Supplies were purchased cooperatively to the value of $4,653,744.[41]

In spite of many local set-backs, by 1940 cooperatives were firmly established in the confidence of Pennsylvania farmers. In 1943 the 177 farmer-controlled cooperatives that purchased supplies or sold produce did a business of $102,000,000 for 172,720 patrons, of whom 93,066 were members. Three-fourths of the farmers of the State were affiliated with one or more cooperatives. The character of the business done in 1943 was:[42]

Marketing Cooperatives	*Number*	*Members*	*Patrons*	*Volume of Business*
Milk	36	21,324	20,596	$43,000,000
Eggs and Poultry	8	8,054	8,355	11,000,000
Fruit and Vegetables	14	2,343	1,856	4,000,000
Livestock	9	3,149	7,908	3,000,000
Wool	22	4,859	3,864	333,000
Purchasing Cooperatives	83	52,903	129,745	40,000,000

The Grange pioneered in the cooperative movement. In 1875 the State Grange established a purchasing agency for its members; in 1912 this was incorporated as the Keystone Grange Exchange. This is primarily a purchasing organization. The Chalfont Grange Cooperative, the oldest community purchasing cooperative in the State, was established by and for local patrons in 1913; it now serves all farmers in that part of Bucks County. From 1875 until 1885 the State Grange sponsored the organization of several cooperative food and supply stores on the Rochdale (English) plan; these were short-lived.

About 1915 it was the expectation of many Pennsylvania farmers that the recently-organized county farm bureaus, with County Agents in charge, would engage in cooperative purchasing and marketing. The American Farm Bureau Federation was organized in 1919 and the Pennsylvania Farm Bureau Federation in 1921 on a paid-membership basis with this as a major objective. The sole objective of Agricultural Extension, however, is educational, not commercial. In 1921, A. C. True of the United States Department of Agriculture ruled, "It would not be proper for the county agent personally to engage in the buying and selling of the farmer's products, to handle the funds in the transaction, or to hold any office in marketing or other farmers' organizations; but there should be no question of his right to encourage in every way possible the farmers who do these things for themselves thru some business manager or cooperative association."[43]

The State Grange strongly opposed the establishment of the Farm Bureau in this State on a paid-membership basis, as it is in some other states, contending that Agricultural Extension, which is supported by public funds, should be available to all farmers alike, not solely or chiefly to those who pay annual dues. This point of view prevailed, and the Pennsylvania Farm Bureau Federation became a commercial purchasing cooperative, wholly independent of Agricultural Extension. In 1939 it had fourteen county organizations, each with a minimum of 350 stockholders who held at least one $10 share of stock.

PRINCIPLES AND PRACTICE OF COOPERATION

The principles of the successful operation of farm cooperatives, developed through many years of trial and error, are:

Democratic control—one member, one vote.

Dividends limited to not more than six per cent on capital stock.

Earnings and savings to be returned to patrons in proportion to their participation.

Many cooperatives that did not adhere to these principles—and some that did—failed.

Purchasing cooperatives handle a great variety of farm supplies, chiefly stock feed, fertilizer, lime, spray materials, binder twine, packages, and seeds. A few handle farm machinery and tools also. According to H. A. Hanneman, "The average selling expense of 42 local supply associations . . . during 1925 amounted to 4.3 per cent of sales—a low expense ratio for retail distributing units. Cardoor distribution, which eliminates warehousing and handling charges and cash sales . . . are the chief factors in the low selling costs of these organizations."[44] In recent years the trend has been toward warehouse rather than cardoor sales.

Marketing and bargaining cooperatives function most efficiently when established on a one-commodity basis. The common method of financing cooperatives that require considerable long-term investment and long-term credit is by issuing certificates of indebtedness. Each member contributes in proportion to the amount of milk he sells through the organization; usually this amount is adjusted once a year. Certificates of indebtedness commonly mature in five years and bear interest at six per cent. In fruit, vegetable, egg, and livestock cooperatives the certificate of indebtedness is based on some unit of production, as the number of acres or the number of livestock. Membership notes are used for short-term credit. Fruit and vegetable marketing cooperatives usually have a daily pool, egg cooperatives a weekly pool, milk cooperatives a monthly pool, and wool cooperatives a seasonal pool.

Both capital stock and non-stock cooperatives are exempt from payment of federal income taxes and from federal anti-trust laws, provided at least fifty-one per cent of their total business is done with members and provided non-members receive the same proportionate patronage dividends as members. Some farm cooperatives that were financed in part with government funds are under attack by private business competitors on the ground that they have an unfair advantage. This criticism has been directed particularly toward purchasing cooperatives.

The farm cooperative movement has been the beneficiary of several State and federal laws. The fundamental concepts of cooperation—one member—one vote, and proportionate payment of patronage dividends—were recognized in the first cooperative Act of June 7, 1887, "To encourage and authorize the formation of cooperative associations, productive and distributive, by farmers and other groups." Certain restrictions in this Act, particularly the requirement that members must contribute money for capital stock, deterred many farmers from becoming members. Not until the passage of the Act of June 12, 1919, did the farm cooperative movement make much headway. The purpose of this Act was "To provide for the incorporation and regulation of cooperative agricultural associations not having a capital stock and not conducted for profit."[45] The Lititz Cooperative Farm Products Association of Lancaster County was the first to be chartered under this Act.

All cooperatives organized under the Act of 1919 were on a non-stock and non-profit basis. Some associations, however, found that they did not have adequate capital under this restriction, so they surrendered their charters and reorganized on a capital stock basis under the Act of 1887 although still operating essentially as non-profit cooperatives. To meet this situation, on April 30, 1929, the General Assembly passed an Act (amended in 1931) providing that cooperatives may organize on a capital stock basis and finance operations through the sale of stock. The Farmers' Cooperative Association of Wysox, Bradford County, was the first to be chartered under this Act. The federal government first gave recognition to farm cooperatives in 1914 in an Act to exclude them from prosecution as a monopoly in restraint of trade.

On December 7, 1933, the Pennsylvania Association of Cooperative Organizations was established to serve as a clearing house for discussions of policy and for legislative action. In 1946 the name was changed to Pennsylvania Association of Farmers' Cooperatives.

Cooperatives have greatly strengthened the economic position of Pennsylvania farmers. They have helped to standardize grades, stabilize production, secure better farm supplies at less cost and better returns for produce sold. They have strengthened the bargaining power of farmers in dealing with distributors and have been a means of training them in the business side of their vocation.

AIDS IN MARKETING

Prior to 1840 little timely information about market prices and conditions was available to farmers. In June, 1844, the editor of *Farmers' Cabinet* of Philadelphia wrote in wonder about "*Morse's Electro Magnetic Telegraph,* [which] has been completed within the last two or three weeks, between Washington and Baltimore, and messages are sent back and forth, by its means, just as rapidly as they can be prepared by the attendant at either end."[46] By 1850 nearly every city and large town in the State had telegraphic market reports, information that enabled farmers to dispose of their produce to better advantage. After 1860 most rural newspapers printed market reports. The telegraph also made possible systematic weather forecasting; in 1858 the Smithsonian Institution at Washington began to gather and map telegraphic weather reports. Alexander Graham Bell first exhibited his telephone at the Centennial Exposition in Philadelphia in 1876. By 1890 there were many rural telephone lines; they were a business as well as a social asset to farmers.

The first public crop report was prepared in 1863 by Isaac Newton, a progressive farmer of Delaware County who later became the first United States Commissioner of Agriculture. It was compiled from the voluntary reports of 2,000 farmers in twenty-one states. About 1875 the State Board of Agriculture began to gather information on crops and market conditions. In 1880 it had "four hundred official reporters . . ., who are appointed by members of the Senate and House of Representatives, and are so situated as to give explicit returns from each district of the State."[47] The first broadcasting of market reports by radio in the United States was from station KDKA, Pittsburgh, in 1920.[48] In 1922 the Bureau of Markets of Pennsylvania Department of Agriculture had market reporters in Philadelphia, Pittsburgh, Scranton, Wilkes-Barre, and other cities; they made daily reports on market conditions and prices in local newspapers and by radio. On March 1, 1924, the joint federal-State crop reporting service was inaugurated. Prior to then the Bureau of Statistics of the Department had gathered and published data; the monthly reports on crops, livestock, and farm conditions were based on returns from about 2,000 reporters in all parts of the State.

The Bureau of Markets in the Pennsylvania Department of Agriculture was established by Act of Assembly in 1917, but the law was defective and the Bureau did not function until after the amended Act of 1919 was approved. Some farmers expected that the Bureau would find markets for their products, but soon it was discovered that it could render greater service by gathering and distributing information on market prices and conditions, establishing and maintaining standard grades, and encouraging the organization of farm cooperatives. In response to strong farmer demand the Department of

Agricultural Economics was established at The Pennsylvania State College in 1923 to train young men for service in this field and to conduct research. Extension Specialists on the business aspects of farming have been employed by the Agricultural Extension Service of the College since the organization of this service in 1914.

The use of standard grades is one of the most effective aids in marketing. Prior to 1900 wheat was wheat; it sold for one price, regardless of grade. The same was true for milk and other products. In 1920 the State Secretary of Agriculture was authorized by the General Assembly to promulgate standard grades for all farm products. U. S. Standard grades were adopted by the State for apples and potatoes and soon thereafter for other products. They are useful in promoting mutual confidence between seller and buyer, especially as a basis for contracts. Livestock cannot be as definitely designated by grade descriptions as crops; these may be subject to individual inspection. The basis for standardization of grades by the federal government and inspection to maintain them is the Grain Standardization Act of 1916, the Food Products Act of 1917, and the subsequent Acts. Some standards are mandatory, others permissive. Since the U. S. standard grades apply only to articles in interstate commerce, it was necessary for the State to adopt them as State grades.

In 1923 the Pennsylvania Department of Agriculture began shipping-point inspection to certify that farm products conform to the requirements of standard grades. The shipper paid for this service at the rate of $5.00 a car or $8.00 a day.

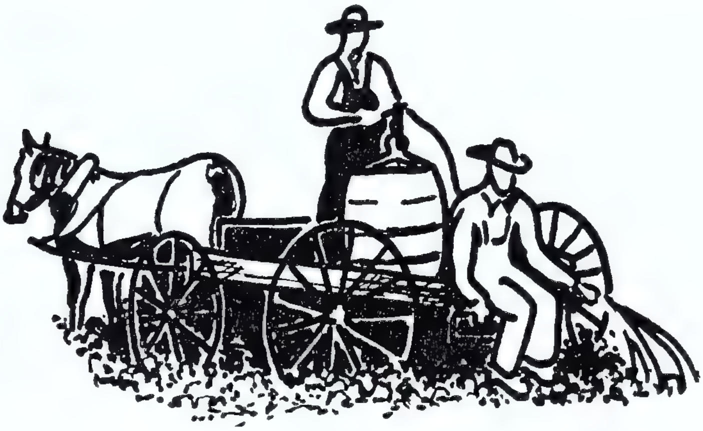
On March 12, 1932, representatives of the potato, vegetable, fruit, poultry, and mushroom industries met to consider the adoption of a State brand which would represent high quality and under which the several groups could market their choicest products. A brand label was adopted which bore the legend:

Pennsylvania Graded Farm Products Packed in Accordance
with Official Standard Grades

The Pennsylvania Department of Agriculture then declared this to be the official brand of the State, and engaged to protect it from abuse. Labels were sent to farmers and packers who requested them. This program was soon abandoned in favor of the use of standard grades and individual brands.

The great industries that have developed since 1900 to handle and process farm commodities, particularly cold storage, canning, dehydration, and deep freezing, have a vital influence on the marketing of these products. The business judgments, policies, and techniques of these industries affect methods of production as well as marketing. Surplus milk produced during the peak season may be delivered to a creamery, cheese factory, or condensery within a few hours after it is received; the processed dairy products are stored until conditions are favorable for their withdrawal for sale. Prior to 1920 cold storages were mostly in cities and were used by market speculators to hoard large quantities of perishable food products for higher prices. After 1925 the use of cold storage by farmers as a facility in marketing became more common.

The deep freeze locker, which keeps farm produce, especially fruits, vegetables, and meats, at or near zero temperature, was developed by Clarence Birdseye in 1925 and was introduced into the retail trade in 1930. By 1940 there were thirty-two commercial locker plants in Pennsylvania where families could store, in small rented lockers, produce they had raised or purchased. Deep freeze lockers changed the buying habit of consumers, especially when small lockers began to be installed in private homes, soon after 1940.



Spraying potatoes with a hand pump, 1895

XIII

An abandoned farm

PROFIT AND LOSS

IN 1908 President Theodore Roosevelt appointed a Commission on Country Life to inquire into the economic and social status of farmers. It reported that agriculture was not as profitable as it should be, considering the investment, labor, and risks, and that social and living conditions in the country fell far short of a reasonable standard. Profit in farming is determined by many factors other than the ability and initiative of the farmer; some of these, as weather, market conditions, national crises, and governmental regulations, are quite beyond the control of the individual farmer. During the century under consideration the pendulum of agricultural prosperity swung between "good times" and "hard times" as frequently as in previous centuries.

Profit and loss in agriculture are relative terms and the standards change with the years. "Under pioneer conditions," said Eugene Davenport in 1904, "the objective of agriculture was simply one of maintenance. The only question at the end of the year was whether enough had been produced to keep the family and the livestock for another year. Now the object of farming is not primarily subsistence but to make money." It would be regrettable, however, if one of the major objectives of farming did not continue to be to lead a way of life as well as to make money.

In considering the economics of agriculture, the important contribution of the farm to the food supply of the family must not be overlooked. The monetary value of this contribution commonly is from $300 to $700 a year. In addition, the farm provides a dwelling. According to J. E. McCord, "Products furnished by the [Centre County] farm toward the family living [from 1930 to 1937] were valued by the farmers at $350 per year. The consumption of 1,312 quarts of milk, 41 pounds of butter, 146 dozens of eggs, 26 head of poultry, 1,021 pounds of pork, 168 pounds of beef, 776 pounds of wheat flour and 45 bushels of potatoes was reported per family."[1] In parts of the Allegheny plateau where farming is largely on a subsistence basis, the amount of food produced and consumed on the farm is far above the average for the State. In 1935 the range was from seven per cent in Chester County to thirty-eight per cent in Forest County.

CAPITAL INVESTMENT

Pennsylvania agriculture is a billion-dollar industry. Investment in farms increased from $462,000,000 in 1850 to $1,177,000,000 in 1940. During these ninety years investment in land and buildings increased three-fold, livestock six-fold, and machinery and tools twelve-fold. The total investment in 1940 was more than twice the investment in mines and quarries, and was second only to the metal and metal products industries. Agriculture has joined the ranks of "big business."

Average capital investment per farm increased from $3,638 in 1850 to $7,287 in 1925[2] and to $11,850 in 1940. The "average" Pennsylvania farmer, however, does not exist. Says G. E. Brandow, "If he could be found, he would have about 5 milk cows, 92 laying hens, 4 hogs, 2 sheep, and a half interest in a beef being fattened for market. His crops would include 15 acres of hay, 12 acres of small grains, 8 acres of corn, 1-1/3 acres of potatoes and vegetables, and a patch of tobacco about the size of a baseball infield. He would not be able to make an 'average' profit because no one enterprise on his farm would be large enough for efficiency."[3]

Instead of dealing with State averages, therefore, it is more profitable to examine the investment in certain individual farms or in representative groups of farms. In 1918 the average investment on fifty representative dairy farms in Chester County ranging from eighty to 160 acres each was:[4]

	Value	*Per cent of Total Investment*
Real estate	$10,834	73.1
Livestock	2,543	17.2
Machinery and tools	902	6.1
Feed and supplies	371	2.5
Cash to operate farm	165	1.1
	$14,815	100.0

Twelve years later (1930), in the midst of a depression, the average investment in 240 farms in southeastern Pennsylvania had increased to $20,174. "On many farms the replacement values of the dwellings and barns were more than the market value of the entire farm."[5] In some parts of the State capital investment to an acre of farm is much higher; in 1930 the 168 farms of Old Order Amish in Leacock Township, Lancaster County, averaging 47.6 acres, had an average capital investment of $12,160.[6] Farm management studies in Centre County from 1931 to 1937 revealed an average capital investment of $11,442. "In addition . . ., each farm had an annual expense bill of $1,557. To operate the farm for just one year the farmer must have on hand at all times a working capital of about $1,000."[7].

It is a principle of agricultural economics that the most productive and most valuable land in a community tends to pass into the hands of those who can cultivate it most efficiently. This is illustrated in the Amish and Mennonite communities of Lancaster County, where land is valued at $250 to $400 an acre, sometimes higher. In 1938 an Amish farm of thirty acres sold for $500 an acre.[8] In 1922 a farm near Hinkletown, Lancaster County, sold for $526.20 an acre.[9] This high valuation was not based wholly on the productive capacity of the soil; it was due, in part, to the reluctance of these good farmers to leave their own church communities. The primary objective of Old Order Amish and Old Order Mennonites is to accumulate sufficient means to establish all their children on farms, preferably in their own community. The horse-and-buggy transportation of the Plain People limits the distance that they can travel and tends to enhance the price of land in their communities.

According to the conservative appraisal of the Federal Land Bank, most of the best limestone land in southeastern Pennsylvania has a maximum value for farming of $100 to $150 an acre; any price beyond that is for reasons other than crop and livestock production. The selling price of this land, however, usually has been higher, even during depression periods. In 1889 Andrew M. Frantz stated, "From 1848 to 1888 . . . the price of land [in Lancaster County] advanced . . . one hundred per cent. or from $90 to $180 per acre. . . . It is safe to say that land in Lancaster county is in reality not worth any more now than it was twenty years prior to 1868. . . . Wheat was selling in 1868 at $3.00 per bushel; corn at $1.75; oats at ninety cents; fat cattle at ten to twelve cents per pound, gross; hogs, fifteen cents per pound, net; hay at twenty-eight dollars per ton. At present [1889] wheat is worth ninety cents; corn, forty-five and oats thirty-two; fat cattle, from three to five, gross; hogs seven cents, net, and hay at fourteen dollars per ton."[10]

Investment in buildings and equipment varies with the type of farming locality, quality of land, and other factors. In 1940 the replacement value of buildings on many farms almost equalled the sale value of these farms. Pennsylvania German farmers, especially, take pride in their commodious and well constructed buildings. In 1930 the average value of buildings on the farms of Old Order Amish in Leacock Township, Lancaster County, was $9,162 out of a total farm valuation of $12,160, or about seventy-five per cent.[11] Of this amount, $3,854 was for the dwelling and $5,308 for the barn and other outbuildings. This proportion was far beyond that which prevailed in most parts of the State. Since 1920 the proportionate investment in machinery and tools has increased greatly. In 1940 many of the more profitable farms of 100 to 160 acres had an investment of $5,000 or more in machinery.

Farm accounts indicate that when total sales in any year are less than twenty-five per cent of the investment there is little if any profit that year; there should be a capital turnover at least once every four years. Many good farmers have paid for the farm out of proceeds in fifteen to twenty years. Some are doomed to perpetual frustration, as much by their personal limitations as by outward circumstances.

TAXES

When asked, "Will not these heavy taxes ruin the country?" Benjamin Franklin, writing as "Poor Richard," replied, "Taxes are heavy, but we are taxed twice as much by our own pride and four times as much by our own folly. From these taxes the commissioner cannot ease us." In the early years of the colony and Commonwealth taxes were a minor expense. Not until the costs of public services, as schools, highways, police protection, national defense, and governmental administration, mounted high did taxes become a major feature of the farmer's budget.

Since 1840 the plaint of farmers has been that real estate carries an undue proportion of the tax burden. Prior to 1840 real estate was the chief investment of capital and constituted most of the visible wealth. Aggregations of capital for the purpose of carrying on large business enterprises were unknown and were not anticipated, hence the system of taxation was based almost wholly on real estate. Not until after 1880 did corporate wealth exceed the value of real estate.

The disadvantage of farmers under the tax system was set forth by G. C. Brown in 1889: "Since 1834 the tax system of this State has been to allot to real estate the burdens of all taxation for local purposes, while . . . the corporate and personal has been charged with the support of the State government proper, including State aid to charitable and educational purposes. The result is that $1,800,000,000 of real estate has to pay about $34,000,000 annual tax, while corporate and personal property pays less than $6,000,000. Every dollar invested in farms pays six times as much as the dollar invested in other business."[12] The occupation of farmer has not been taxable since 1844; this exemption was upheld by the State Supreme Court in 1924 after this tax had been levied in several counties.[13]

As corporate wealth increased, with little tax relief to agriculture, farmers were aroused to indignant protest. Said Eastburn Reeder of Bucks County in 1890, "We do not want to pay nine mills on the dollar in taxes upon our land, our horses and our cattle, while personal property, in the shape of bonds and mortgages, and railroads and other corporations, pay but three mills. We do not want to pay tax upon our indebtedness . . ., while bank and railway corporations have their indebtedness deducted."[14] In 1891 the General Assembly passed "An Act to provide revenues for the purpose of relieving the burdens of local taxation," but it was a palliative, not a remedy.

On January 25, 1909, the State Grange addressed the Governor and General Assembly in these convincing words: "We, farmers and citizens of Pennsylvania, herewith set forth certain discriminations and hardships imposed upon farm and home owners by the unequal and antiquated tax laws of Pennsylvania. These exact from real estate appraised for taxation at $4,172,955,443 a tax of $69,881,707 annually or an average of sixteen mills on a dollar. Under authority of the same laws only $19,824,964 are collected from personal and corporate property which is appraised at $6,511,485,670, or an average tax of only two mills on a dollar."[15] The farmer's tax load was made heavier in 1913 when the sixteenth amendment to the constitution was approved, authorizing the levy of a federal income tax. After 1917 farmers had to struggle with long and involved income-tax forms.

Notwithstanding periodic protests, farm taxes continued to mount. The investigations of Fred P. Weaver showed, "The average amount of tax paid per acre on Pennsylvania farm real estate was twice as great in 1924 as in 1913."[16] He concluded, "In 1925 the farmers of Pennsylvania paid $36,000,000 of taxes; their share in the total tax bills of all citizens of the state, on the basis of incomes, should have been about $25,000,000."[17] This conclusion was supported by Clyde L. King who stated, "Agriculture as a whole in the state carries a tax burden that consumes at least a 13 per cent larger share of the total earnings of the farm and the farmer than do all taxes paid out of the average earnings of the state."[18] It was little comfort to hard-pressed Pennsylvania farmers to learn that farmers in adjoining states were similarly harassed. In 1922 Pennsylvania farmers paid taxes averaging $1.11 an acre as compared with $.52 in West Virginia, $.85 in Maryland, $1.13 in New York, $1.24 in Ohio, and $2.22 in New Jersey.[19] The validity of these taxes is affected by the relative productive power of the land.

One of the most disturbing features of the rural tax problem was inequality of assessment. In 1886, a speaker told the State Board of Agriculture, "The returns show the strangest inequality of assessment in the several counties of the State, some being as high as eighty-five per cent. of actual value, while others are as low as fifteen per cent."[20] In 1890, another speaker reported to the same Board that the total amount of taxation on a $10,000 farm (actual value) varied from $58.50 in Northumberland County to $203.20 in Cameron County.[21] In 1925 Fred P. Weaver found that in several counties "the ratio of assessments to selling prices [of farms] varies from about 10 per cent to over 150 per cent."[22] Because of inequitable assessments some farmers paid from two to nine times as much tax in proportion to the value of the farm as others in the same township. In the more sparsely populated low-income counties, assessments were heaviest in proportion to farm value; and tax delinquencies were most prevalent in these counties.

The resentment of farmers over tax inequity, which had been simmering for many years, reached the boiling point about 1930. Aside from slight relief through State aid for schools and roads, the first direct legislative action of any consequence was in 1927. In that year farm organizations, working through the Rural Legislative League which included members of both branches of the General Assembly who were sympathetic to lifting the tax burden on agriculture, secured the repeal of an Act that had been in effect for many years imposing a tax on horses, mules, and cattle above four years of age. In 1929 the State Council of Farm Organizations sponsored a study of rural taxation by Fred P. Weaver. Rural Tax-Payers' Associations were organized in many counties to investigate methods of levying taxes and how tax money was spent.

The Tax Justice League of Pennsylvania was organized in 1932. On March 28, 1933, "Several thousand representatives of tax-payers' associations, gathered at Harrisburg . . ., told the Governor and the members of the State Legislature in no uncertain terms that relief from the burdensome taxes on real estate in this state must be given. . . . From all over this state come reports that [the taxpayers] are wielding a tremendous influence in lowering local road, school and county taxes."[23] Special consideration was given by these aroused farmers to the mounting costs of local government. In 1932 the Pennsylvania State Chamber of Commerce reported, "On the average, the people of Pennsylvania will spend one-third to one-fourth of their gross income for the support of government. They work one day out of every three or four to satisfy the demands of the tax collector. Local taxes constitute seventy per cent or more of the total." In 1937 the average cost of local government to a citizen was $5.51; the range was from $2.91 in Mifflin County to $14.70 in Allegheny County.

During the depression period that followed World War I the rural tax problem became acute. Said F. P. Weaver, "The taxes, which averaged $53.38 per farm in 1913, amounted to an average of $137.32 per farm in 1931. . . From 1919 to 1922, . . . while the index of prices of farm products dropped 64 points, taxes increased 55 points. . . . In 1931 there were required two and one-half times as many farm products to pay the taxes as were required in 1913."[24] In 1929 farmers still paid a tax on gasoline used in tractors and stationary engines, although this was exempt from taxation in thirty-four other states. In 1931 the State Attorney General ruled that no farm can be considered a manufacturing plant, hence the forty or more incorporated farms were subject to the State corporation tax, from which manufacturing corporations were exempt.

With gradual improvement in the economic position of the farmer after 1936 and extension of a larger measure of State aid for schools and roads, a considerable measure of tax relief of agriculture was effected; but the situation, though greatly improved, was far from satisfactory.

PRICES

"When in an individualistic economy such as Americans have enjoyed for three centuries," said Fred P. Weaver, "production becomes, as in recent years, largely for the purpose of sale, prices are the sole guide of the producer. Even if agriculture is destined to be brought under a limited degree of regimentation, prices will still play a dominant role in motivating effort on the part of the farmers."[25] The purchasing power of the farmer—the relation between the prices of what he sells and the prices of what he buys—is an even more reliable index to farm prosperity. Prices are influenced by the supply of gold, credit expansion, paper money expansion, and many other factors besides supply and demand.

In 1840 the prices of farm products were at a very low point. They rose somewhat during the fifties, and Civil War inflation carried them to new heights during the sixties. In 1846 Thomas Burrowes stated, "Experience shows that when wheat, which generally regulates the price of other articles, sells for about $1 a bushel in market, the general prosperity . . . is best. When it falls materially below that sum, [there is not] a sufficient compensation for the farmer."[26] In March, 1860, prices at the farmers' market, Lewistown, were:[27]

Wheat, white, bu.	$1.30	Clover seed, bu.	$3.50
Wheat, red, bu.	1.20	Timothy seed, bu.	2.00
Corn, bu.	.60	Potatoes, bu.	.40
Rye, bu.	.70	Apples, bu.	1.50
Oats, bu.	.30	Butter, lb.	.16
		Eggs, doz.	.10

The peak of Civil War inflation was reached in 1864, when the price of corn at the farm was $2.50 or more a bushel. Thereafter the price level receded for thirty years; this was the most protracted depression period in the history of American agriculture. In 1880 average farm prices were:[28]

Wheat, bu.	$.85	Potatoes, bu.	$.27
Corn, bu.	.37	Hay, ton	8.53
Rye, bu.	.60	Clover seed, bu.	3.60
Oats, bu.	.26	Butter, lb.	.20

In 1894 the farm price of wheat was $.65, corn $.45, oats $.34, and other commodities in proportion. In midwestern states corn was not worth shipping; farmers used it for fuel.

Beginning about 1900 the price trend was upward; it continued to rise during the two decades preceding World War I. Average prices at the farm in 1900 were:[29]

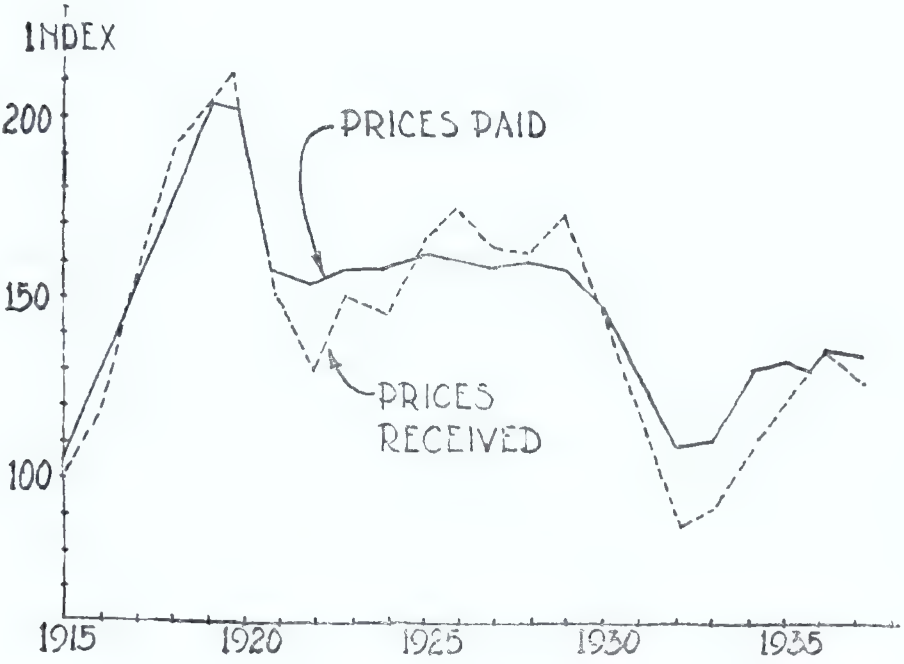
Wheat, bu.	$.73.3	Butter, lb.	$.20.4
Corn, bu. (shelled)	.48.2	Chickens, dressed, lb.	.11.9
Oats, bu.	.32.6	Fat hogs, lb.	05.6
Potatoes, bu.	.53.9	Fat steers, cwt.	4.64
Timothy hay, ton	13.85	Milk, 100 lbs., wholesale	1.18
Clover hay, ton	11.20	Milk, qt., retail	.05

During World War I prices received by farmers more than doubled —and cost of production, likewise. In May, 1917, wheat was $3.00 a bushel. Prices at the farm on December 1 of that year were: wheat $2.05, corn $1.53, potatoes $1.35, hay $17.50.[30] In 1919 President Woodrow Wilson issued a proclamation setting a guaranteed minimum price of $2.20 for wheat. This action was not applauded by farmers, since similar ceilings were not set on the cost of machinery, fertilizers, labor, and supplies.

In 1920 there was a sharp break in inflated war-time prices that carried them back to about fifty per cent above the pre-war level. Between 1929 and 1933 the general collapse of the national economy again cut the prices of farm products in half. The percentage drop between 1928 and 1932 was: wheat 61, corn 61, potatoes 49, eggs 44, milk 50, beef 53, pork 52.[31] In 1930 and again in 1931, Pennsylvania farmers were offered only thirty-five to fifty cents a bushel for wheat at threshing time. For the first time in years many farmers kept their wheat on the farm and fed it to livestock.

Between 1929 and 1939 there was wide fluctuation in average prices received by farmers. The range for milk was from $1.10 a hundred pounds, wholesale, to $3.00; eggs, from thirteen to fifty-six cents a dozen; hogs, from $4.00 to $12.00 a hundred pounds.[32] The most extreme price fluctuation was for potatoes, from $3.90 a bushel in May, 1920, to fifty-one cents in May, 1921. By 1940 prices had made considerable recovery but were still about one-fourth below those in 1920.

The weather has a major influence on prices. Farming is a contest between man and nature; sometimes nature wins. In general, however, Pennsylvania farmers are less subject to severe loss from unfavorable weather than farmers in many other states. Annual rainfall is the chief determining factor in crop production; normally this ranges from thirty-four to fifty inches in different parts of the State. The length of the growing season ranges from an average of 200 days in the southeastern counties to about 100 days in the north-central counties.



Index of prices received and prices paid by Pennsylvania farmers, 1915-1938

Occasionally serious summer droughts have cut the farmers' income severely. "The drouth of 1881," said Eastburn Reeder of Bucks County, "exceeded in duration any former one since the settlement of our State. . . . From July 1 to October 1, a period of ninety-two days, the total rain-fall, as recorded at two different stations in Bucks county . . . [was] 1.5 and 1.8 inches."[33] Another disastrous drought occurred in 1930, especially in southern and southwestern counties. Farmers cut their stunted corn in August and fed it to stock, for pastures were bare; no winter feed was harvested. Other serious droughts occurred in 1856, 1871, and 1876.

Protracted summer rainfall occasionally causes loss. In 1919 it was reported, "The storm has been very severe on Chester County wheat. Stacks partly built are like a green pasture all over the top, while shocks are green and rotten. The oats could not be cut."[34] About 1920 a few insurance companies experimented with crop insurance but soon abandoned it; the risks were too great. Crop insurance by the federal government was begun in 1939.

Unseasonable temperatures may upset the best laid plans of farmers. Late spring or early fall frosts or freezes may take heavy toll, especially in orchards. A Venango County farmer recalled the disastrous spring freeze of 1859: "June 1st, 1859, promised the farmer a good return for his labor. Crops were good and the season early. But it turned cold and wet. . . . On the 5th my father was out with the wagon. When he came home in the evening mud and ice was frozen on the wheels. Next morning everything was frozen white and stiff. We kids scraped up frost and snowballed. Men walked the county hunting work, willing to work for 25 cents per day. Farmers sacrificed their stock to procure the absolute necessities of life."[35] The blizzards of January, 1857, and March, 1888, blocked country roads with great snowdrifts for weeks and caused much hardship to farm families and to livestock.

Notwithstanding occasional vicissitudes caused by unfavorable weather, the promise of God to man after the Flood has been fulfilled: "While the earth remaineth, seedtime and harvest, and cold and heat, and summer and winter, and day and night shall not cease." (Genesis 8:22.)

PURCHASING POWER

"High prices are fool's gold to the farmer who has little to sell," said Fred P. Weaver. "Goods not prices determine wealth. The volume of goods which the farmer can buy with the money he receives for his products is the real test of his prosperity."[36] In colonial days, when the average annual cash purchases of a farmer rarely amounted to over $50 a year, he was not affected materially by the tariff. Now, when ninety per cent or more of what he produces is sold and fully eighty per cent of what his family eats and wears is purchased, the tariff policy of the federal government vitally affects the farmer's profit and loss.

The most common method of making comparisons of prices or of purchasing power is by the use of index numbers. The average of the five-year period 1910-1914, which was free from unusually disturbing economic factors, has been taken as the base and designated as 100; prices or purchasing power for other years are compared with those of this base period, or "parity." On this basis the composite purchasing power of twenty leading farm products of Pennsylvania on January 1 from 1915 to 1927 was:

Year	*Price Index of Farm Commodities*
1915	105
1916	91
1917	85
1918	98
1919	99
1920	88
1921	98
1922	91
1923	83
1924	85
1925	90
1926	99
1927	100

"In the spring of 1927 the purchasing power of 20 farm products in Pennsylvania was on a par with their average purchasing power in the five pre-war years, 1910 to 1914, although their composite price was 50 per cent above the pre-war average."[37] The highest point in purchasing power was reached in 1929 when it was 120. In 1932, when depression began to grip the country, it was 101, and in 1933 it had dropped to 78.

The relation between prices paid for commodities and services between 1935 and 1940 and prices received for farm products was:[38]

Year	*Index Number of Prices Paid*	*Year*	*Index Number of Prices Received*
1935	98	1935	94
1936	99	1936	104
1937	106	1937	109
1938	100	1938	96
1939	98	1939	97
1940	100	1940	100

In the twenty-four years between 1916 and 1940, farmers enjoyed an advantage in purchasing power only six years.

Labor income is one of the best criteria by which to appraise the prosperity of the farmer. This is the earnings of the family from the land after deducting total expense and interest on investment from total income, including inventory increments. The amount of labor income is influenced by soil, weather, size of farm, and many factors other than market conditions and the ability of the farmer. It ranges from a minus quantity to a comfortable living.

A survey of fifty representative dairy farms in Chester County in 1918, when market conditions were favorable, revealed that the average labor income was $1,761. In addition, the farmer had house, milk, vegetables, fruit, meat butchered for family use, fire wood, and other family necessities.[39] A survey of dairy farms in the same county during the lean years 1931-1932 showed, "The average labor income per farm decreased from $845 in 1930 to $110 in 1931-32, even with more efficient farming methods."[40] In 1931, on representative farms in Tioga County "gross receipts per farm averaged $2,257. Since the expenses were $1,401 a farm, the income from capital investment and the farmer's labor was $856. Allowing 5 per cent interest on the average capital of $8,180, or $409 for interest, left the average farmer, in addition to a house to live in and $340 worth of farm products for the use of his family, $447 of a labor income as pay for his year's work."[41] Some farmers, even during these difficult years, had many times this amount on the credit side of the ledger; they were better farmers than the "average."

Among the factors that influence labor income are quality of soil and volume of business. A survey of Wyoming County farms in 1930 revealed that the average labor income of farms on gravelly or sandy loams was minus $246; on gravelly silt loams, $263; on the best, well-drained upland soil, $969."[42] "In 1930 farms [in Chester County] having over 20 cows averaged $1278 labor income while farms having less than 11 cows had an average labor income of $228. On farms where the average production of milk per cow was less than 5000 pounds, the average labor income was minus $388, in 1931."[43] Very small farms are at a disadvantage with respect to labor income because of high investment in buildings to the acre, less efficient use of machinery, and smaller volume of business. Nevertheless, from the small holdings of Amish farmers in Lancaster County, averaging forty-seven acres, "the farmers expect an annual gross income of $4,000 to $5,000."[44]

COST OF PRODUCTION

During World War I and the depression period that followed, some embattled farmers demanded of the government, "Give us cost of production plus a reasonable profit, as is done for industry." The determination of cost of production in farming, however, is far more difficult than in industry. It varies with the management efficiency of the farmer, size of farm, character of soil, quality of livestock, the weather, and many other factors, some of which are wholly beyond the control of the farmer. One farmer's cost of production may be twice that of his neighbor. Cost of production records are useful as a guide to the individual farmer in planning his farm enterprises, and the average costs of many farmers carry considerable weight in governmental price-fixing but at best they are approximations.

Since the founding of the Commonwealth, some good farmers have kept farm accounts. One of the most outstanding examples of meticulous record-taking is the Merkel family of Cumberland County. This family kept continuous records for a century, begun by Jacob Merkel in 1818 and continued by his son Levi and his grandson David until 1912.[45] One of the early attempts to determine cost of production was by a Fayette County farmer in 1847. He reported:[46] "One acre of land that will yield fifteen bushels of wheat, costs at this time thirty-three dollars thirty-three and a third cents.

Interest thereon, at six per cent per annum	$2.00
Cost of ploughing, sowing and harrowing	1.50
Cost of seed	1.00
Gathering and threshing	1.50
Total expense of raising fifteen bushels of wheat	$6.00
Average expense per bushel, forty cents."	

Civil War inflation is revealed in the accounts of a Montgomery County farm of 100 acres for the year ending April 1, 1865:[47]

Cr.		
250 bu. wheat @ $2.50	$625	
400 bu. oats @ $1.00	400	
500 bu. corn @ $1.40	700	
300 bu. potatoes @ $1.50	450	
2,400 lbs. butter @ .60	1,440	
Pork, lambs, veal, wool, hay, poultry, orchard fruit, and dairy products in excess of home consumption	600	
		$4,215
Dr.		
One hired man	$300	
One hired boy	100	
One hired girl	150	
Harvest labor	125	
Taxes and repairs	300	
Feed	400	
Incidental expenses	150	
		$1,525
Profit		$2,690

From this amount should be deducted the interest on capital investment; probably this did not amount to more than $900.

The average cost of production for the four-year period 1877-1880 was calculated by the State Board of Agriculture "from detailed figures supplied by farmers in many counties." They were: wheat $.85; corn $.37; rye $.60; oats $.26; potatoes $.27; butter $.20; hay $8.53.[48] The more exact farm accounts and cost of production records kept in recent years have helped to stop many leaks on farms and detect unprofitable farm enterprises.

FARM DEBT

Most Pennsylvania farmers are wary of going into debt, whether it is secured by mortgage or not. They strive to pay bills as these become due and not to spend money where they do not have it. They try to put away something "for a rainy day." This is one reason why Pennsylvania agriculture has been more stable than that of some other states during the recurring periods of inflation and depression. Imprisonment for debt was not abolished in this State until 1842, but prior to that time few farmers languished behind prison bars for this reason.

Farm mortgage debt in Pennsylvania never has been excessive. In 1886, in the midst of a prolonged depression, it was estimated, "Not more than 15 per cent. of the farms are mortgaged. . . . The source of this prosperity is found in the local markets of the State."[49] In 1910 twenty-nine per cent of the farms were mortgaged for an average of $1,368 a farm; in 1935, thirty per cent. At the depth of the depression of 1929-1935, farm indebtedness amounted to $122,750,000, or less than the value of the production of one year and less than fifteen per cent of the total farm wealth.[50] During the worst years of that depression, from 1930 to 1935, farm mortgage debt was reduced from $168,472,000 to $147,688,000, and 1,368 farmers paid off their mortgages in full.[51]

The Federal Farm Loan Act, commonly called the Rural Credits Law, became operative July 17, 1916. It provided for the establishment of Federal Land Banks and Joint Stock Land Banks. These gave farmers an opportunity to refund short-term mortgages and short-term loans on a long-term, non-callable basis. They then knew definitely what the exact semi-annual payments would be and were assured that no large part of the loan would become due at any time. Other lending agencies of the federal government were established during the years 1933-1936, chief of which were the Production Credit Associations and the Farm Security Administration.

Mortgage debt is a millstone around the necks of farmers who over-extend their credit in flush times. During the inflation that followed the Civil War some farms were sold for far more than they were worth; currency inflation made paper money plentiful and prices high. With deflation and shrinkage in values, the mortgage often became more valuable than the farm. To avoid foreclosure the unfortunate borrower was forced to "pour money down a rat-hole." Such a case was reported by F. P. Weaver: "A farmer in Bedford county, Pa., in 1865 borrowed the proceeds of the sale of 67 bushels of wheat from one of his neighbors when wheat was selling for $3 per bushel and gave his note for $200. With the rapidly declining prices that followed, he was unable to pay the interest from year to year but occasionally gave a new note covering the principal and interest. In the nineties, when the holder of the note died, it was found that 1,800 bushels of wheat, then selling for 50¢ per bushel, were required to pay the debt."[52]

The same situation has existed during other depression periods. "In 1920," says W. E. Keepper, "the return from 99 forty-quart cans of milk was required to pay the interest on a $4,000 mortgage and the real estate taxes on a 100-acre Pennsylvania farm, but in 1933 nearly two and a half times as much milk was required to meet these costs. . . . By 1933 the value of a farm purchased in 1920 for $10,000 had decreased to about $5,600. A purchaser of a $10,000 farm, who in 1920 paid $4,000 down and assumed a mortgage debt of $6,000, . . . if he had made no payments on the principal, would by 1933 actually own no part of the place in which he had invested $4,000."[53]

Until recent years farmers were handicapped in securing loans to carry on their business and improve their farms. Prior to 1915 many rural banks were rather indifferent to the need of farmers for short-term loans. One of the first to change its policy was the Grove City National Bank of Mercer County. Under the initiative of E. C. Harshaw, its cashier, this bank began in 1916 to make available to dependable farmers funds for purchasing purebred livestock and labor-saving machinery, draining wet land, remodeling barns, erecting silos, and making other permanent improvements. This enlightened self-interest bore fruit in an increase in farmer deposits of nearly half a million dollars between October 1, 1916, and January 1, 1918.[54] This experience led to the organization of the Agricultural Committee of the State Bankers' Association and to a much more liberal policy on the part of rural banks generally in extending credit to farmers. Under this policy farmers were enabled to buy fertilizer, lime, spray materials, feed, and other supplies for cash, at a considerable saving.

During the severe depression years of 1932-1936 this new spirit of helpfulness on the part of rural banks was the salvation of many a hard-pressed farmer. *Pennsylvania Farmer* recounts, "A farmer got behind in his interest on his mortgage. His taxes were due and he had no money. The only thing he had which could be turned into cash was a crop of corn, and corn was cheap. . . . Faced with an apparently impossible situation, he expected the bank which held his mortgage to take his farm. However, instead of foreclosing, the bank bought some livestock and told the farmer to feed his corn. He did so and sold fat stock for enough to help out and give him renewed hope. . . . In a depression debt is a creditor's problem as well as a debtor's problem."[55]

On March 24, 1933, the General Assembly passed a chattel mortgage law which made it possible for a farmer to borrow from one of the several federal lending agencies and give as security a mortgage on his livestock, large pieces of farm equipment, or on any crop planted or to be planted within one year from the date of the execution of the mortgage.

Old Order Amish farmers seldom need loans from banks or government agencies. For generations they have avoided making investments outside their own church community and have loaned available money only to members of their church. Says Walter Kollmorgen, "[This practice] has served to give these people a rural credit system enjoyed by few farmers elsewhere . . . (1) no money is borrowed unless it is necessary, (2) . . . the interest rate is low, (3) there are no foreclosures, (4) bank failures and business failures do not disturb the community greatly, (5) investment sharks cannot plunder these people, and (6) the interest earnings remain in the community."[56] The Old Order Amish take care of their poor; none of them is on "relief." In recent years, however, they have not been able to be as self-sufficing financially as they once were and have had to deal with outside agencies to some extent.

"Boom and Bust," 1840-1873

Between 1840 and 1860 Pennsylvania agriculture passed through a period of painful readjustment, from the old order of self-sufficing farming to the new order of commercial farming. Competition from the West, especially in wheat and livestock, changes in transportation, labor-saving machinery, and the rapidly increasing demand of Pennsylvania cities for locally-grown perishable food necessitated radical changes in farm management and in the farmer's point of view. Pennsylvania farmers began to see the wisdom in the counsel of Alexander Hamilton (December 5, 1791): "It is nevertheless a maxim, well established by experience, and generally acknowledged, where there has been sufficient experience, that the aggregate prosperity of manufactures and the aggregate prosperity of agriculture are intimately connected."[57] They began to produce mainly for local markets instead of for the export market.

From 1846 to 1848, while the Mexican War was in progress, and for a few years after, there was a brief period of fictitious prosperity. This was more than offset by the panic of 1857 to 1859, which was due chiefly to over-extended railroad building. The Bank of Philadelphia, the leading financial institution of the State, closed its door. Many State banks fell with it. Those that weathered the storm suspended specie payment. Corporations crashed, the fires of industry burned low, building operations ceased, and unemployment was widespread. There was far less distress in rural districts than in cities, but many sales of farm products had to be made on a barter basis and land values declined sharply.

In 1842 Great Britain removed its prohibition of the importation of American cattle and in 1849 it abolished the duty on wheat. The Irish famine of 1846 stimulated export demand for wheat, and the widespread European famine of 1847 drove its export price up to $1.25, from which it declined gradually until the Crimean War of 1854.

Between 1840 and 1855 the tide of emigration from Pennsylvania to the West, mainly to Ohio, Illinois, and Wisconsin, reached its height. Some of these adventurous pilgrims were discontented with their lot here, but many were successful farmers. Said one who remained behind, "Many of them are our very best farmers. . . . Lancaster, Berks and other of our best farmed and most densely populated counties, have furnished, and are still furnishing, a large proportion of these emigrants."[58] The hill counties had increasing numbers of abandoned farms. The gold rush to California in 1849 accelerated the westward movement. Said William H. Seward, "The world seems about evenly divided into two classes—those who are going to California in search of gold and those who are going to Washington in search of office."

In 1852 a Centre County farmer commented, "This tide of emigration [to the West] seems to flow mainly from the Eastern Counties. . . . Almost every one of our newspapers abounds in recommendations of the Western lands . . . while the merits of our own beautiful and productive valleys are wholly overlooked."[59] By 1860 western settlement had extended to Minnesota, Iowa, and Missouri. Favorable land laws made it easy to secure a farm in the West with little means; it was a long and arduous task to hew a farm from the remaining virgin timber land of Pennsylvania, whereas prairie land required little effort to bring it under the plow.

The outbreak of the Civil War, in 1861, quickened the sluggish economic life of the nation into feverish activity. Agriculture prospered as never before. The greatly accelerated domestic demand for food was accompanied by increased European demand because of poor harvests there in 1860, 1861, and 1862. Farm mortgages contracted in gold were paid off with inflated paper currency. Country banks increased their circulation to two or three times their capital stock. The suspension of specie payment in 1861 made it unnecessary for banks to redeem their notes in coin. With his pockets stuffed with greenbacks the farmer was—he thought—in easy circumstances. Lured by war prices, many farmers expanded their acreage; land prices soared. Unskilled labor commanded $2.00 to $2.50 a day. Retail prices spiralled upward. Henry B. Plumb quotes these prices for the Wyoming Valley:[60]

October, 1863	flour, bbl.	$8.50
	butter, lb.	.30
November, 1865	flour, bbl.	13.00
	butter, lb.	.55
May, 1867	flour. bbl.	17.00
March, 1869	butter, lb.	.52

The years from 1865 to 1873 were flush times. Men made haste to get rich quickly. They squandered money recklessly in speculative adventures. Instead of paying off their mortgage debts, many farmers invested their profits in stocks and bonds which, a few years later, were worthless. “It is probable,” said Samuel C. Moon in 1896, “that at no time or place in the world’s history has any community or its inhabitants enjoyed more of the comforts and social pleasures of civilized life than did the farmers of Philadelphia, Chester, Delaware, Bucks and Montgomery counties . . . during the middle half of the present century.”[61] Other parts of the State, as well, bloomed under the genial warmth of this golden sun.

High tariffs on imports were an important factor in the effulgent period. After the Civil War the “infant industries” of the nation, particularly of Pennsylvania, clamored for high tariffs on manufactured goods “to keep out cheaper goods made by the pauper labor of Europe.” Farmers were told that protection to industry would be an advantage to them, also, because the high wages that would be paid to workers in industry under the protective system would make it possible for these consumers to pay high prices for food. This argument sounded reasonable; so most Pennsylvania farmers joined manufacturers in political action. Soon, however, the infant industries became industrial giants; then farmers had to sell their produce in an unprotected, cheap world market and buy in a protected, expensive market. This disadvantage persisted for many years.

“Hard Times,” 1873-1896

The panic of 1873-1879—one of the worst in the history of the nation—was the natural aftermath of the rampant inflation of the Civil War period. It was precipitated by over-expansion in agriculture, manufacturing, and railroad building, a plethora of inflated paper currency, and a multitude of speculative enterprises which yielded little or no return. On September 18, 1873, the great banking house of Jay Cook and Co. of Philadelphia closed its doors. This paralyzed the economic life of the State; soon the economy of the whole nation was demoralized. Commerce was prostrated, mills, factories, and furnaces were idle, property value shrank. Unemployment reached new heights; by 1878 the country swarmed with “tramps” and “hobos.”

The depression hit most heavily farmers who had over-extended their operations during flush years; they were unable to secure credit except from private capitalists who exacted exorbitant interest rates. This financial debacle had been building up for several years. In 1871 *Practical Farmer* of Philadelphia warned, "The large number of the best farms in Eastern Pennsylvania, advertised for sale in the public papers, evidence that causes are at work, lessening the profits of the farming business."[62] The innate courage and resourcefulness of the American people never were better exemplified than in the Centennial Exposition, which opened in what is now Fairmount Park, Philadelphia, on May 10, 1876. In spite of the prevailing economic distress it was a marked success; the industrial and mechanical exhibits were outstanding and the agricultural exhibits were of astonishing scope. The Exposition stimulated interest in more efficient farming, especially the use of labor-saving machinery.

Competition from the West continued to harass Pennsylvania farmers. During the decade 1870-1880, more than 297,000 square miles, an area equal to that of Great Britain and France combined, were added to the cultivated land of the United States.[63] In 1875 the General Assembly made an attempt to mitigate the damaging effect of the very low freight rates on western grain to eastern mills, but to no avail. Thousands of Pennsylvania farmers emigrated to the West, there to raise more grain and still further handicap producers in the old home State. Others moved to the cities. The census of 1890 revealed that two-thirds of the rural counties had declined in population during the decade.

Between 1880 and 1890 there was a furor over the number of abandoned farms. Most of these ought to have been abandoned anyhow because they could not be operated at a profit, being in an unfavorable location or lacking native fertility. Boys began to drift away from farms. There were numerous legislative inquiries, essays, and discussions on "how to keep the boys on the farm." Rural fathers and mothers entreated their sons in song:

"Stay on the farm, boys, stay on the farm,
Though profits come in rather slow.
Stay on the farm, boys, stay on the farm;
Don't be in a hurrry to go."

But many went, and gave of their youth and energy to the building of the West and of the great cities. At meetings of the Grange and at other rural gatherings the subject discussed most commonly was, "Does Farming Pay?" Almost invariably the verdict was, "No."

During this trying period Pennsylvania farmers, especially those who lived near cities and towns, swung over more generally to the production of perishable commodities. In 1884 they were advised by H. E. Stockbridge of Massachusetts, a noted authority on agriculture, "It [is] absolutely impossible for the Pennsylvania farmer to hope to successfully cope with his western rival [in the production of food staples]. . . . To the West belongs the growth of corn and wheat by the inalienable right of location and natural advantage. . . . We should devote our energies more exclusively to the production of perishable articles . . ., of which class fruit and milk are the chief representatives."[64] Pennsylvania farmers heeded this counsel, in principle, but continued to grow corn in abundance to feed dairy cattle and considerable wheat as a cash and nurse crop.

During this protracted depression many farmers went bankrupt. According to F. P. Weaver of Dauphin County, "In the valley where the writer happened to be born, it was said, in the late nineties, that one-fourth of all the farmers had gone through bankruptcy in the decade preceding. . . . Many of those same farmers, after losing all their earnings, continued to farm and accumulated a fair competence in the next twenty years when prices were tending upward."[65] Even the best farms did not yield an average annual return of three per cent between 1880 and 1890.[66] In 1886 the condition of farmers in Lawrence County was reported to be "worse than at any time since the war; and that there are $300,000 of mortgages and $150,000 of judgments against the farmers of that county."[67]

During the early nineties the gloom thickened. In 1890 the State Board of Agriculture was informed, "On all sides we behold the depreciation of farm property, a sure test of the unprofitableness of agricultural industry. . . . Between 1870 and 1880 [the loss to farmers in the market value of their farms] amounted to $68,000,000 and there is no question but that the census of 1890 will show a still heavier shrinkage. From every quarter of the state and especially from the oldest settled and richest agricultural counties comes the same doleful tale. Berks County reports more sheriff's sales of farm property than in any three previous years. . . . Hence when forced to a sale, and the sales are few now which are not forced, it not unfrequently happens that a judgment which when laid was estimated fairly for one-half the value of the farm, now, with interest and costs, takes the whole and leaves the farmer stripped clean. . . . No longer is it with the farmer a matter of getting rich or even making money; it has narrowed down to a struggle for a bare subsistence."[68]

Though their discouragement was great, Pennsylvania farmers did not participate to any extent in the agrarian revolt of the seventies and eighties which centered in the Mississippi Valley. This was partly because their farming was more diversified and hence more nearly self-sufficing, but mainly because they were more conservative. Pennsylvania farmers were not represented in "Coxey's Army," which marched on Washington to impress upon Congress the grievances of the working classes.

Even during the darkest years of the depression, most Pennsylvania farmers made a living and a few made a modest profit. In 1887 a Crawford County farmer stated, "Pennsylvania has hundreds of farms, stocked with animals and farm implements, which would not bring in market three thousand dollars, the interest on which, at present ruling rates for property well secured, would not bring more than two hundred dollars. Now, what kind of living would an annuity of two hundred dollars give even a small family? And yet on a capital of three thousand dollars . . . whole families obtain good livings, keep the principal secure, educate the children, [and] ride to church."[69] In 1890 the Secretary of the State Board of Agriculture reported, "Notwithstanding this depression we find in every community farmers who are quietly making money."[70] In 1891 a Dauphin County farmer asserted, "The patient is not nearly so sick as they would have us believe. . . . Our sheriff the other day assured me that he has not during the past two years . . . sold out a single farmer who attended strictly to his business. . . . That as a rule, the failure resulted from neglect of the farm, either from dabbling in politics, speculation, from endorsement [of notes] or from whiskey. . . . On our waste land we can grow enough persimmons to effectually stop the mouths of all croakers."[71]

After 1892 the situation began to improve. The financial panic of 1893-1897 did not materially check the upward trend in agriculture. It did cause a general lack of confidence in banking institutions and all types of commercial paper; this had the effect of bringing farm land into greater demand as an investment. The number of auctions is a reliable barometer of conditions in farming. In 1896 the State Department of Agriculture reported, "There are less farms offered for sale than for years past, and . . . if a farm is in the market, it will soon command a purchaser at a figure considerably in excess of that which the same property would have brought a year or two age."[72] By that time most of the public domain in the West had been taken; there being no more free land, Pennsylvania farmers began to realize an increment in the value of their holdings. The economic pendulum had begun to swing back.

WORLD WAR I "PROSPERITY," 1897-1920

The years from 1897 to 1914 were relatively prosperous for agriculture. Production was fairly well balanced with demand. The Spanish-American War, which began in April, 1898, was of too brief duration to have much inflationary effect. In 1899 John Hamilton, State Secretary of Agriculture, calculated that the average net income per farm that year was $991.29 and that the necessary money outlay for a family of five was $623.30, leaving a surplus of $368 which could be used to pay debts or invested.[73] The following year he added, "The year 1900 has been one of prosperity for the farmers of Pennsylvania. . . . [In farmers' bank accounts, there has been] an increase of 44½ percent. since 1895."[74] In 1904, good Cumberland Valley farms yielded five per cent on the assessed valuation which generally was near, often up to, the full public sale value.[75] Between 1900 and 1910 the average value of a Pennsylvania farm and its equipment increased from $4,690 to $5,715. A large proportion of this increment was in livestock and machinery. By 1908 the swing to agriculture was quite evident. In 1914 it was felt by many economists that reaction was imminent, but the beginning of World War I restored the upward trend.

Between 1910 and 1920 the universal theme for discussion among urban consumers was "the high cost of living." Usually the finger of accusation was pointed at the farmer. "The indolence and cupidity of the farmer is the main reason for the high cost of living," pontificated a Philadelphia newspaper. The metropolitan press waxed hot about the situation and urged the government to make searching investigation into the affairs of "profiteering farmers." Between 1913 and 1917 urban consumers organized meat, egg, and milk boycotts. At that time strictly fresh eggs were retailing for thirty-nine cents a dozen. In 1913 the State government called a conference on the high cost of living; this pinned most of the blame on farmers.

By 1917 the pinch on salaried consumers was sharp. Milk retailed for fifteen cents a quart, butter for fifty-five cents a pound, and eggs for fifty-five cents a dozen. The slogan of the hour was "Back to the land"; this was proclaimed from the platform, preached from the pulpit, and set forth enticingly in city newspapers. Comparatively few urban back-to-the-landers made an economic success of their venture.

Active participation of the United States in the epic struggle "to make the world safe for democracy" began on April 4, 1917, but the war had been in progress since August 1, 1914. During these three neutral years the war had a definitely inflationary effect on American agriculture, particularly on the price of wheat and meat, which were in greatly increased demand abroad. When a state of war was declared, President Woodrow Wilson called on farmers to make an unprecedented effort to produce more food, not only for ourselves and for our armies but also for a large part of the nations with which we had made common cause. At rural gatherings the most popular song, next to the national anthem, was "The Farmer Feeds Them All." A widely heralded slogan was, "Food will win the war."

Pennsylvania farmers were under heavy pressure, as a patriotic duty, to change their long-established system of farming so as to produce more wheat. Howard Heinz of Pittsburgh was appointed Federal Food Administrator for the State by Herbert Hoover, National Food Administrator. The General Assembly created the State Council of

Defense to cooperate with the State Department of Agriculture and other agencies in stimulating greater food production, especially of wheat but also of meat, milk, and vegetables. "War gardens" sprang up on thousands of vacant city lots. Even some golf course greens were plowed for corn.

Pennsylvania farmers evidenced their usual common sense in responding to this appeal. Few disrupted their regular crop rotation. Most of them came to the conclusion reached by a Berks County farmer: "We are all considering how to plan our farm operations so as to most nearly meet our country's food needs and at the same time maintain our business on a profitable basis. It is important that we do not let ourselves be unduly influenced by the agitation for doing unusual things in the way of production as a war measure. . . . Therefore let us not enter rashly into plans of trying new crops but expand as much as possible the lines of farming we have been conducting with success."[76] Few Pennsylvania farmers plowed sod land that normally would go into corn and sowed wheat instead. In spite of acute labor, machinery and supply shortage, high costs, and some unfavorable weather, in 1917 and 1918 they exceeded the average production of the preceding five years:

	Five Year Average, 1912-1916	*1917*	*1918*
Wheat	23,732,000 bu.	24,483,000 bu.	24,718,000 bu.
Corn	59,177,000 bu.	62,212,000 bu.	62,112,000 bu.
Oats	36,538,000 bu.	41,125,000 bu.	47,191,000 bu.

The recently-organized Agricultural Extension Service was particularly effective in helping farmers to make this very creditable contribution to the war effort.

Consumer prices continued to be high during the war. Between 1915 and 1919 the cost of living advanced nearly 100 per cent. As usual, farmers were made the scapegoat; in the view of metropolitan newspapers they were the grossest of war profiteers. Said the New York *Journal of Commerce,* "The war profits to the farmer on wheat must be more than a dollar a bushel. Farmers, as a class, will pocket immense war profits." In 1917 a Philadelphia daily sneered, "Pork, profits and patriotism are trotting along together in the neatest little three-horse hitch imaginable." In 1919 Governor William Sproul presided over a conference of representatives of consumers, industry, and agriculture to assess the blame for the high cost of living. It pinned major responsibility on the farmer.

It is true that many farmers did profit more than usual during the war period, but not anywhere near the extent of profits in industry and commerce. In 1918 the State Grange observed that a United States Treasury Department report showed that in 1917 one food dealer made a profit of 2183 per cent in excess of his profit in 1916; a liquor dealer, 1220 per cent; a cold storage plant, 472 per cent; a flour miller, 235 per cent; a meat packer, 204 per cent; a soft coal operator, 504 per cent; a department store, 331 per cent.[77] Few Pennsylvania farmers made more than a reasonable return on their investment; many made no profit whatever. Milk producers, especially, were at a disadvantage; in 1918 they received about three and a half cents a quart; and all costs, particularly labor and feed, were extremely high. Some were forced to dispose of their herds. If farmers made money, most of it was used to buy Liberty Bonds.

In an effort to induce farmers to sow more wheat, governmental price-fixing was invoked in 1917 and 1918. The basic price set in 1917 was $2.20 a bushel, f. o. b. Chicago, with a scale of differentials for different types and grades. No ceiling, however, was set on what the farmer had to buy or on the price of labor. Said Gifford Pinchot in 1918, "The farmer knows as well as any one that the price of $2.20 a bushel for wheat was not fixed in order to guarantee him a high price. It was fixed in order to guarantee the city consumer against a higher price. . . . [Farmers know] that the price they were getting was being held down by artificial restriction when the prices they were paying were rising at pleasure. . . . Nearly every other producer of the things essential for carrying on the war is assured of a profit. . . . [The farmer] does not want huge profits himself . . . but he does want reasonable business security. . . . At present it is denied to him."[78]

One of the best indices of farm prosperity is land values. In several of the mid-western states the selling price of good farm land advanced more than 100 per cent between 1913 and 1920, from about $100 to $200 and even $500 an acre. In more conservative Pennsylvania the average increment was less than thirty per cent. The failure of taxes on land to rise commensurate with the rise of prices of farm products helped to give it a fictitious value for the time being.

During the three crop years 1917, 1918, and 1919 the purchasing power of wheat was higher, in comparison with the average of other farm commodities, than it ever had been before. Nevertheless, in 1917 a Delaware County farmer showed statistically that the average cost of producing wheat in that county was $2.14 a bushel, based on a yield of eighteen bushels an acre. Although war-time prices of farm products were high, the costs of production were still higher. This was particularly true of farm labor. If it could be secured at all in competition with the much higher prices paid by factories and industries that operated on a cost-plus basis, it cost two or three times as much as before the war. In April, 1920, farm wages reached a peak of 238 as compared with the base period of 1910-1914, which was 100.

During the war farmers and their families did not quibble over "union hours," specified wage scales, or cost-plus contracts. "The farm army . . . has never considered such a thing as a strike," said one editor in 1918. "We farmers may kick for better prices and for a square deal for agriculture but while we kick we continue to work and to produce. . . . [The farmer] is quietly going about his business to the tune of sixteen hours per day, cultivating and harvesting and preparing for another crop, limited in acreage only by his strength and ability to get labor."[79] On many farms women and children worked long hours in the field and in the barn while their men were in the army or navy. Farmers and their families set a high standard for patriotic service among producers of materials essential to winning the war.

"The war," said one disillusioned soldier in 1917, "will last a hundred years—five years of fighting and ninety-five years of winding up the barbed wire." If his words are taken figuratively instead of literally, they were inspired prophecy. It will take a century or more to clear up the social and economic maladjustments that were generated by this great catastrophe.

Armistice Day, November 11, 1918, marked the close of hostilities but not the end of the war-time inflationary spiral. This was at its peak in early 1920. Over-sanguine farmers continued to buy with a lavish hand—automobiles, fur coats, more land, stock in oil fields. In July, 1920, the glittering market collapsed. By early 1921 the prices of farm products were back to or below pre-war levels. Europe could no longer pay for our wheat and pork. Farmers were confronted with a vast surplus and a restricted market.

The primary post-war depression of 1920-1922 was part of a general business slump, but the prices of farm products fell faster and much farther than the prices of goods that farmers had to buy. Some farmers had contracted debts with the expectation of repaying them by selling wheat at $2.50 a bushel and eggs at sixty cents a dozen. Within the space of a few months the prices of these commodities dropped nearly one-half, but the debts remained unchanged. Said the editor of the *North American,* "The violence of the fall in commodity and security prices in this country during the last few months has been unprecedented. . . . Within six months 60 per cent cent . . . of the price advances made during the last six years has been canceled."[80] This post-war deflation conformed to the general pattern that had prevailed after previous wars. Said Fred P. Weaver, "Each war in this country was first followed by a severe drop in prices, then by a brief recovery and then by a gradual decline for a period of fifteen to twenty years."

Viewing the situation in the fall of 1921, a Cambria County farmer quoted a local newspaper: "Taking 100 as the index basis for prices in 1913, farm crop prices now stand at 109, building materials at 212, house furnishings at 273, clothing at 197, fuel and light at 207"; then the farmer added: "I give for comparison some prices which I paid in 1913 and 1921:

	1913	*1921*
Lump lime per ton	$3.00	$8.55
16 pc. acid phospate per ton	$9.72	$17.49
Oliver plow point	.40	$1.00
Binder twine, per lb.	.07½	.14
Re-setting [horse] shoe	.15	.40

About a week ago Cambria County potatoes were loaded on the car at 47 cents a bushel. . . . It would require a yield of [105] bushels per acre at 47 cents to pay for the seed."[81]

During this period of rural depression and relative urban prosperity, 1920-1923, some embittered countrymen seriously proposed that farmers imitate labor organizations and limit output in order to raise values. In 1923 the General Assembly appointed a legislative commission "to ascertain what is wrong with farming in Pennsylvania." It held hearings in different parts of the State but made no contribution to a solution of the problem.

The number of abandoned farms increased. Sheriffs were busy with foreclosures. Mortgage indebtedness, which increased from an index of 100 in 1910 to 182 in 1920-1930, created an acute problem when prices dropped. In 1923 a Clinton County farmer stated, "There is scarcely a farm in this section which, if the buildings were destroyed, could be sold for enough to restore the buildings. Few farms can be sold for what it cost to build the house and barn. . . . At quite a number of public sales this spring, the tax collecter and the sheriff were on hand, and before the sale could go on, the tax gatherer was made safe, whether anything was left for the farmer or not."[82] Business failures among Pennsylvania farmers were few, however, as compared to farmers in some western states. In 1924 the United States Department of Agriculture reported that more than eight per cent of the owner farmers in fifteen wheat and corn-producing states lost their farms, with or without legal processes, between 1920 and the spring of 1923. Of those who lost their farms, over two-thirds did so as a result of purchasing them or other farm land at very high prices during the war-time boom period.

Late in 1923 the farmers' economic stress began to ease somewhat. During the next few years agricultural values, unlike industrial values, did not regain all the ground lost in the primary post-war depression. The "farm problem" and "farm relief" continued to be discussed in the halls of Congress. Farmers received relatively less compensation than city workers; the average earnings of the farm family in 1926-1927 were only seventy per cent of its earnings in 1920-1921, whereas the average earnings of urban families remained about the same. Farmers did not share, proportionately, in the fictitious "Coolidge prosperity" of 1924-1928. Although the cash income of Pennsylvania farmers for 1924-1928 averaged $245,000,000 a year, the prices of what they had to buy continued to be high and there was little if any profit. Taxes were excessive. In 1927 a retired Fayette County farmer complained, "I put out my farm of 92 acres at $800 cash rent, and my taxes on the same reached more than $700."[83]

THE "GREAT DEPRESSION," 1929-1936

The "roaring twenties" blew up with a resounding bang late in October, 1929, when the security market crashed. Agriculture had had its private post-war depression since 1920; the new collapse of values affected all branches of the economy and was nation-wide, even world-wide. Not until after 1936 did the purchasing power of the farmer begin to rise appreciably. His brief period of advantage during the war was far more than offset by his extended period of disadvantage after the war.

The teachings of history should have prepared the American people for this debacle, but most of them, even some distinguished economists, could not read the handwriting on the wall. In October of that fateful year Irving Fisher and other national authorities assured the public that America was "dwelling upon a permanently high plateau of prosperity." President Herbert Hoover predicted, "We shall soon be within sight of the day when poverty will be banished from the nation." Yet by January, 1931, there were more than 6,000,000 unemployed, some of them veterans who sold apples on street corners in the great cities for a bare living. In the spring of 1932 there were over 15,000,000 unemployed and 6,000,000 were on public relief. Bread lines were common. Pennsylvania, with eight per cent of the population, had ten per cent of the unemployed.

In 1920-1922 agriculture was shocked; in 1929-1936 it was paralyzed. The golden dreams of 1916-1919 turned into nightmares. In 1931 the prices of farm products were the lowest since before the Civil War; the total cash income of Pennsylvania farms was $123,000,000, which was $60,000,000 less than in 1929 and averaged only $800 per farm. In normal times the farmer receives about forty cents of the consumers' dollar; in 1932 he received less than a third. The index of farm prices was at its lowest point in March, 1933, when it was 66 as compared with 100 for the period 1910-1914. In that year 500 bushels of wheat were required to buy a grain binder; in 1919, fifty bushels.

Forced sales of farms were numerous. In April, 1933, Governor Gifford Pinchot issued a proclamation: "Farmers are daily losing homes and farms in large numbers by reason of the foreclosure of mortgages . . . largely because the dollar they are required to pay is worth far more in good and is much harder to earn than the dollar they borrowed." He called upon holders of farm mortgages to "suspend all . . . execution processes . . . during the present economic emergency, except where a mortgagor is clearly able to pay his indebtedness."[84] So great was the resentment of farmers at foreclosures that in some states neighbors assembled at a sheriff's sale and forcibly prevented free bidding, causing the property to be knocked down to one of their number for a nominal price, after which it was returned to the farmer. No such extra-legal procedures were reported in Pennsylvania, but frequently neighbors pooled their resources in order to set friends on their feet again. The proportion of forced sales to the total number of farms was small in Pennsylvania as compared with western states; most farmers had played it safe during the boom years.

In September, 1934, the General Assembly met in special session to consider unemployment relief. In 1935 there were 22,000 "farm operators," or twelve per cent of the total number of farm families, who were receiving relief grants. Most of these, however, were not *bona fide* farmers; they were urban unemployed and coal miners who had temporarily squatted on small parcels of land for the duration of the depression. Few of those who had chosen farming as their permanent vocation were on public relief. Some of the reliefers abused the privilege. In 1935 *Pennsylvania Farmer* reported, "We are told of a farmer who while on relief has purchased a new manure spreader and a new gang plow for his tractor. Another man is reported to have sold his farm for $10,000 which he still has, but he has been on relief for many months."[85] Some of these chiselers took the position that they were entitled to this aid because the cities had lived on the fat of the land for several generations and should now pay back part of the unearned increment to farmers.

In severe depression periods agriculture acts as a shock-absorber to industry; it carries on the land many urban people for whom no remunerative employment is available in cities. In 1932, when there were 1,500,000 unemployed in the State and when wheat was selling at the lowest price since the time of Queen Elizabeth, many more people returned to farms than left them. The country-ward movement was accelerated during 1933 and 1934. City newspapers promoted a "back-to-the-land" movement as a means of assuring economic independence for unemployed urban workers. Much of this counsel was misdirected. Commented *Pennsylvania Farmer* "Those eminent armchair agriculturists, the editors of city papers . . . are calling attention to the fact that the state owns large areas of cheap land, . . . on which the unemployed might be located and where they might be financed until they are able to repay the loans made to them, presumably from the state treasury . . . They ignore the fact that the state lands, or such areas of them as were once called farms, are public property for the very reason that they could not return a living to those who knew something about farming . . . even when prices of their products were much higher than now . . . farming requires capital, skill and business ability—all of which the unemployed lack."[86] Some impoverished city workers who had been reared on farms were able to wring a livelihood from the land temporarily. After 1935 the trend of population cityward was resumed.

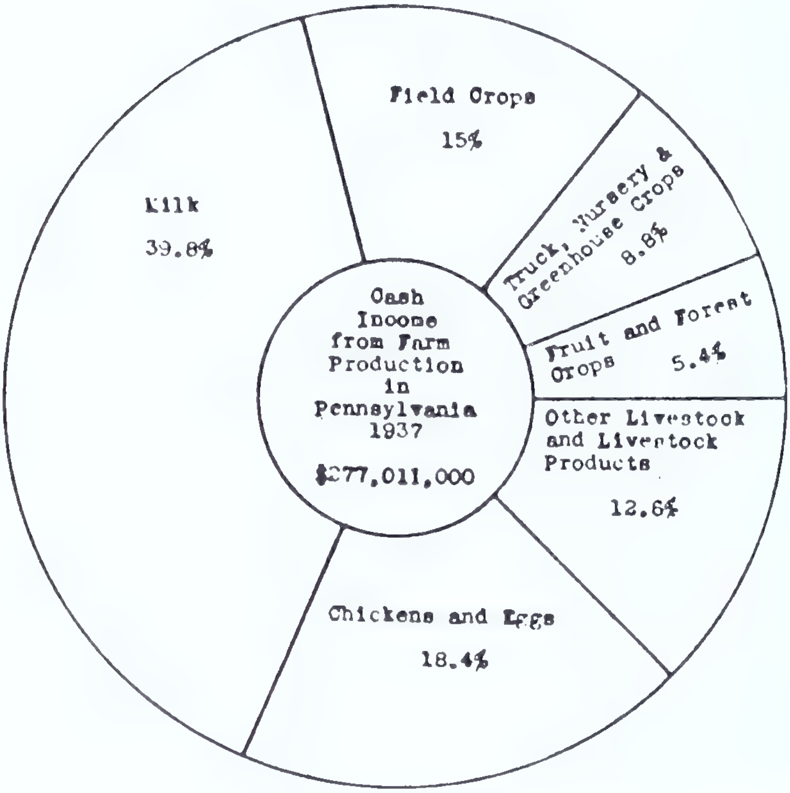
The bewilderment, panic, bitterness, and loss of self-confidence of many urban unemployed from 1929 to 1936 were not much in evidence among farmers; they had jobs and most of them could make at least a meager living. The farmer's wife bore her full share of the load. Long-unused means of making and saving money on the farm were again brought into play. Household arts and crafts of an earlier day were revived—making baskets, quilts, and chairs. Soap-making, fruit and vegetable drying, canning, pickling, preserving, and bread making filled her busy days. The farmer's wife was a true helpmeet in this emergency; she had taken her man "for better or for worse."

"The only thing we have to fear is fear itself." These ringing words of President Franklin D. Roosevelt in his inaugural address on March 4, 1933, gave new courage and hope to the nation. His administration immediately set in motion activities that led to a political, economic, and social revolution. The measures taken by the federal government to bring the nation out of its doldrums (Chapter 14) may be controversial as to the principle involved and as to method, but they did bolster the staggering economy. In 1935 a distinct upward trend was evident. In 1937 the cash income of Pennsylvania farmers was $274,000,000, about twice what it had been in 1931. By 1940 the purchasing power of the Pennsylvania farmer was 96 as compared with the prosperous period of 1910-1914, and was thirteen points above that of the nation as a whole. The chief sources of farm income that year were:[87]

Dairy products	$100,731,000	Potatoes	$12,350,000
Eggs	33,730,000	Hogs	8,899,000
Cattle and calves	28,124,000	Wheat	7,827,000
Truck Crops	15,574,000	Apples	6,429,000
Chickens	14,427,000	Tobacco	5,864,000
		Corn	4,397,000

The outbreak of World War II in Europe in 1939 was the signal for the beginning of another inflationary spiral. By 1940 the United

States, though not actually engaged in the conflict, was very much involved; the dividing line between defense and war was thin. Once again history was about to repeat itself.



Crops and farm income

XIV

Cutting ice

AGRICULTURE AND GOVERNMENT

THE farmer of 1840 was self-reliant. The farmer of 1940, while retaining much freedom of choice, was dependent on government to a marked degree. This fundamental change was brought about in part by changed conditions of life and in part by a changed philosophy about the relationship of government to the individual. Whether this be for good or ill depends largely on personal political conviction. In any event, it is a far cry from the philosophy voiced by Liberty Hyde Bailey in 1915: "We shall produce a much better and safer man when we make him self-controlling by developing his sense of responsibility than when we regulate him by exterior enactments."[1]

STATE BOARD OF AGRICULTURE

Prior to the organization of the State Board of Agriculture in 1876 the State government took little interest in agriculture. In 1853 the General Assembly had under consideration a plea from farmers that a State Agricultural Chemist be appointed to determine the relative value of different brands of commercial fertilizers.[2] The following year the State Agricultural Society recommended the passage of a law providing for the appointment of a "State Inspector of Guano."[3] The Legislature turned a deaf ear to both requests.

In his message to the General Assembly in 1857 Governor James Pollock recommended the "establishment of an Agricultural Bureau, in connection with some one of the State Departments, to give efficiency to the collection and diffusion of useful knowledge on this subject."[4] This recommendation, likewise, failed of enactment. In 1871 the Philadelphia Society for Promoting Agriculture, the State Agricultural Society, and the Fruit Growers' Society of Eastern Pennsylvania petitioned the General Assembly to create a State Department of Agriculture. This was not done at that time; but in 1874, when the State Department of Internal Affairs was organized, it was directed, through its Bureau of Statistics, to compile and publish statistics on agriculture and was charged with the administration of the few agricultural laws of the State.

In the 1876 session of the General Assembly, John P. Edge, member of the House from Chester County, introduced a bill to create a State Board of Agriculture. It followed closely the Ohio law of 1846, the Massachusetts law of 1851, and the Maine law of 1856.[5] It was approved on May 8, 1876. The functions of the Board were both administrative and educational; it was charged with responsibility for enforcing State laws relating to agriculture and with supervision of the numerous county and local agricultural societies. It was directed to "investigate such subjects relating to the improvement of agriculture in the state as it may find proper." The Board was composed of the Governor as Chairman, the Secretary of Internal Affairs, the Secretary of Public Instruction, the Auditor General, the President of the State Agricultural College, three members appointed by the Governor, and one representative of each county agricultural society which was entitled to receive financial aid from the county under the Act of 1851. It was authorized to appoint a Secretary and to prescribe his duties.

The Board was organized February 1, 1877, with Thomas J. Edge of Chester County as Secretary. For a number of years its chief regulatory duties were the administration of the oleo law of 1878, the commercial fertilizer law of 1879, and the animal disease control law of 1887. It collected statistics on crop and livestock production through correspondents, or crop and livestock reporters, in every county. These were appointed by the respective members of the General Assembly. The educational function of the Board was exercised chiefly by holding quarterly meetings open to the public, one at Harrisburg and the others in different parts of the State. At these meetings "essays" on agricultural subjects were read and timely farm topics discussed. These meetings were well attended by farmers. The proceedings were reported voluminously in the annual *Agriculture of Pennsylvania,* which also included the proceedings of the State Agricultural Society and other farm organizations. Most of the copies of these ponderous volumes were distributed by members of the General Assembly to their constituents.

In 1887 the Act was amended to permit the board to hold Farmers' Institutes throughout the State; these developed into one of the most useful services of the Board. Each county representative on the Board had charge of institutes held in his county. Farmers' Institutes were continued until 1920.

Although the State Board of Agriculture was intended to be primarily an arm of the State government in the enforcement of laws, it aspired to be an educational and research agency as well. In 1878 it appointed the following technical staff.

Botanist, Thomas Meehan, Germantown.
Pomologist, Josiah Hoopes, West Chester.
Chemist, F. A. Genth, University of Pennsylvania.
Entomologist, W. A. Buckhout, Pennsylvania State College.
Veterinary Surgeon, Charles B. Michner, Carversville.
Microcoscopist, Henry Leffman, Philadelphia.
Geologist, J. P. Lesley, Harrisburg.
Mineralogist, F. A. Genth, University of Pennsylvania.

Later an Ornithologist was added. These positions were honorary, not remunerative. Members of the technical staff made annual reports to the Board; these were published in *Agriculture of Pennsylvania.*

The Board was an unwieldy body. In 1880 it had thirty-eight members in addition to the five *ex officio* members and the three appointed by the Governor. In 1894 it had seventy members, of whom sixty-one were elected by county agricultural societies. Its efficient Secretary, Thomas J. Edge, acted for it in an executive capacity. The Board accomplished much with little means. In 1884 it reported, "The amount which the State annually appropriates for the work of the Board is $3,900, which is, by law, distributed as follows: For the actual and necessary expenses of members in attending meetings of the Board, $1,500; for . . . office expenses, $650; for investigating diseases among live stock, $250; and for the salary of the Secretary, $1,500."[6] The educational meetings held by the Board in different parts of the

State duplicated to a considerable extent the programs of the State Agricultural Society. There was rivalry between the two groups. By 1885 the influence of the State Agricultural Society had begun to wane.

After 1890 the authority of the Board increased rapidly with the enactment of new laws. The Farmers' Institutes became one of the most important agencies for the advancement of Pennsylvania agriculture. The General Assembly looked to the Board for guidance in agricultural legislation. In 1878 the Assembly referred to it for an opinion on a proposed bounty to encourage the production of jute and other textile fibers. Recalling the costly and futile State bounty on silk, the Board gave the General Assembly this sound counsel: "We are not prepared to advise it. . . . The effect of State bounties for such objects is too often to give the project an undue and unnatural stimulus, which seemingly carries it forward in a proper course, but when withdrawn, it will result in the complete abandonment of the project. The best stimulus for this and other new crops, is a clearly demonstrated profit. With this it needs no State aid, and without this no State aid can make it truly and fairly successful."[7] The Board continued to have meager funds. In 1894, when it was about to be superseded by the State Department of Agriculture, its total appropriation was $16,500, of which $9,500 was earmarked for Farmers' Institutes.

As the number of agricultural laws increased it became evident that their administration should rest with a single executive responsible to the Governor, hence the Pennsylvania Department of Agriculture was created in 1895. It was the intent of the General Assembly to abolish the State Board of Agriculture at that time, but political pressure prevented this action. The Board continued to function in an advisory capacity on legislation and its members had charge of Farmers' Institutes held in their respective counties. The General Assembly made no appropriation to the Board, and members attended its meetings at their own expense. The forty-first and last annual meeting was held at Harrisburg on January 22-23, 1918. At the beginning of the administration of Governor William C. Sproul, in 1919, all regulatory activities of the State relating to agriculture were centered in the Secretary of Agriculture, and the State Board of Agriculture went out of existence. It had served a useful purpose.

PENNSYLVANIA DEPARTMENT OF AGRICULTURE

An Act of General Assembly approved March 13, 1895, created the Pennsylvania Department of Agriculture to take over duties previously performed by the State Board of Agriculture.[8] "It was the supposition of the Legislature that the act creating the Board had been repealed by the one creating the Department, but such [was] not . . . the case."[9] Thomas J. Edge, who had served effectively as Secretary of the Board since its organization, was appointed Secretary of Agriculture; he also continued to serve as Secretary of the Board. Other appointments were:

John Hamilton, Director of Farmers' Institutes.
J. T. Rothrock, Commissioner of Forestry.
Levi Wells, Dairy and Food Commissioner.
Leonard Pearson, State Veterinarian.
B. H. Warren, Economic Zoologist.

Although the Secretary of Agriculture was responsible for the enforcement of all laws relating to agriculture, including forest protection, his Bureau chiefs still had, by law, almost complete autonomy. The Dairy and Food Commissioner (Act of May 26, 1893), the Commissioner of Forestry, and the State Veterinarian reported to him only as a matter of courtesy.[10] This anomalous situation continued until 1919.

In 1915 the General Assembly passed a bill creating an Agricultural Commission; this was an administration measure sponsored by Governor Martin Brumbaugh. The editor of *Pennsylvania Farmer* commented, "Criticism . . . arises as a result of the lack of a unified department. The bureaus nominally composing the Department of Agriculture are really so many independent bureaus whose heads are appointed by the Governor, but which in legal courtesy report to the Secretary of Agriculture. . . . The proposition . . . is to bring the work together under one head, a commission."[11] The Act of 1915 gave the Secretary of Agriculture executive authority over the appointments and activities of the several bureaus. The Commission, which was composed of seven members appointed by the Governor, was given general administrative authority over the Department of Agriculture and the Livestock Sanitary Board. Thus was confusion worse confounded.

Although theoretically the Agricultural Commission was the governing body of the Department of Agriculture, it never functioned as such and was ignored by both the Governor and the Secretary. With the incoming of the administration of Governor William C. Sproul in 1919, both the Agricultural Commission and the State Board of Agriculture were abolished and all State-supported regulatory agencies for the benefit of agriculture, including the Livestock Sanitary Board, were centered in the Pennsylvania Department of Agriculture, under the administration of the Secretary of Agriculture, a member of the Governor's cabinet. The administrative code of 1923 brought all laws previously assigned to different Bureaus for enforcement, such as the Bureau of Foods and the State Veterinarian, under the Department of Agriculture.

The Secretaries of Agriculture have been: Thomas J. Edge, 1895-1899; John Hamilton, 1899-1903; N. B. Critchfield, 1903-1915; Charles E. Patton, 1915-1919; Frederick Rasmussen, 1919-1923; Frank P. Willets, 1923-1927; Charles G. Jordan, 1927-1931; John A. McSparran, 1931-1935, J. Hansel French, 1935-1939; John H. Light, 1939-1943; Miles Horst, 1943-1954.

Prior to 1915 the functions of the Department of Agriculture were not clearly defined. In addition to regulatory duties it engaged in both education and research; in education, through Farmers' Institutes, field demonstrations, and the publication of information bulletins; in research, chiefly at its Animal Pathology Laboratory on an eighty-acre farm near Harrisburg. There was considerable overlapping of activities with The Pennsylvania State College. Largely through the influence of the State Grange, in 1915 this confused situation was clarified somewhat; the Department began to restrict its activities to law-enforcement, leaving education and research mostly to the College, save for such investigations as were necessary to the effective prosecution of its regulatory function.[12] Not until 1925 was this separation of function fully effective.

The service of the Department to Pennsylvania agriculture has grown with the years as new laws have been placed on the statute books and new responsibilities have developed under existing laws. By 1940 the salaried personnel had increased to 303 and the State appropriation to $1,721,000, of which approximately one-half was for payments to farmers of indemnities for cattle slaughtered in the control of bovine tuberculosis and Bang's disease, and for premiums at agricultural fairs. In that year approximately $660,000 in revenue was brought into the State Treasury from fees and fines incident to the enforcement of laws administered by the Department. The Forestry division was made a separate department in 1901.

Of the many laws which the Department administered in 1940, the following were most important; they indicate the wide scope of its service:

Bureau of Animal Industry.

Prevent, control, and eradicate by quarantine and other measures, transmissable diseases of domestic animals. The work on bovine tuberculosis and Bang's disease of cattle is in cooperation with the United States Department of Agriculture.

Make *post-mortems* on specimens of diseased animals sent in by citizens.

Inspect slaughter houses, markets, cold storages, and other premises where meat is stored or offered for sale, to ensure that conditions are sanitary.

Issue licenses for stallions.

Enforce the dog-license law for the protection of livestock.

Inspect hatcheries and poultry flocks, and certify the products as free from disease.

Bureau of Plant Industry.

Enforce quarantines and apply control or eradication measures against certain injurious insect pests and plant diseases, as San Jose Scale, Japanese beetle, gypsy moth, corn borer, potato wart.

Inspect nurseries, plants imported into the State, and orchards for certain injurious insect pests and plant diseases, as peach yellows, fire blight, and oriental fruit moth.

Test the purity and viability of agricultural seeds offered for sale.

Inspect and certify as to purity and freedom from disease seed potatoes (begun in 1923), tomato seed (begun in 1930), brambles (begun in 1931), and small grains (begun in 1936).

Inspect colonies of bees for disease control.

Bureau of Foods and Chemistry.

Safeguard public health by keeping off the market unwholesome or adulterated food and by preventing fraud in the manufacture and sale of foods, as milk, butter, eggs, ice cream, sausage, canned goods.

Regulate the manufacture and sale of oleo and other butter substitutes.

Regulate egg-opening plants and cold storage warehouses.

Analyze and protect against adulteration or low standards feeds, fertilizers, lime products, insecticides, and fungicides.

Bureau of Markets.

Establish and maintain standard grades for farm products, provide grade inspection, and establish standard containers.

License and bond dealers who handle farm products on commission.

Collect and disseminate information on market prices and conditions, and assist farmer cooperatives.

Supervise the Pennsylvania Official Egg Laying Contest.

Division of Crop Reporting and Information.

Assemble and disseminate statistics on crops, livestock, and other phases of Pennsylvania agriculture (in cooperation with the United States Department of Agriculture since 1924).

In 1921 the General Assembly provided for a triennial census of farm conditions by township assessors to supplement statistics gathered by the federal Bureau of the Census every ten years. The Pennsylvania Department of Agriculture is in executive charge of the State Farm Show in cooperation with the Farm Show Commission and the Farm Show Committee. It performs a similar service for the State Soil Conservation Commission.

Among the more important laws assigned to the Department for enforcement are:

General pure food (adulteration, misbranding)	June 26, 1895 May, 13, 1909
Adulteration or coloring of milk and cream	June 10, 1897
Manufacture and sale of oleo and other butter substitutes	May 29, 1901
Adulterated, renovated, or processed butter	May 7, 1937
Filled milk	March 21, 1923
Sanitary milk containers (sold in original package)	May 21, 1937
Milk and cream butterfat (3¼ per cent in milk)	June 8, 1911
Cheese grades	June 23, 1897
Fresh eggs	July 10, 1919
Ice cream	June 5, 1937
Fresh meat, poultry, game, fish	March 28, 1905
Pure vinegar	June 18, 1897
Contagious diseases of fruits (yellows, fire blight)	April 28, 1899
Commercial fertilizers	March 25, 1901
Lime products	June 1, 1915
Commercial feeding stuffs	April 25, 1901
Contagious diseases of animals	May 26, 1897; May 2, 1901
Nursery inspection	June 10, 1901
Apiary inspection	April 6, 1921
Pure seeds	April 29, 1917

Many of these regulatory laws have been amended several times. From time to time laws have been enacted and quarantines established for the control of specific insect pests and plant diseases. Among these are the European potato wart disease, April 18, 1919, and the Japanese beetle, July 23, 1923.

State Milk Control Board

An emergency milk control law was passed by the General Assembly in 1933 as a temporary expedient to halt the precipitous downward trend of the market, with the provision that it expire in 1937. It authorized the Governor to appoint a Board of three members who were directed to hold hearings in various parts of the State and to set prices for different classes of milk in each district—what the farmer received, what the distributor received, and what the consumer paid. The Board did not command the confidence of the public or enlist the cooperation of farmers and dealers to any considerable degree; its policies were vacillating, and changes in its personnel were frequent. At the meeting of the State Grange on December 19, 1936, that influential body declared its "opinion that price fixing on commodities will not work successfully; that such price fixing is justified only as an emergency measure. The emergency which called for a milk control law in Pennsylvania is over."[13] Nevertheless, when the law expired in 1937 a majority of the dairy interests, both producers and distributors, seemed to favor the enactment of a permanent milk control law, and this was done.

The preamble to the permanent law recited, "The constant supply of pure milk to inhabitants of the Commonwealth is imperiled; danger to the public health is immediate and impending." A commendable feature of the law was its provision that prices set were to be based upon factual evidence presented by producers, distributors, and consumers at hearings held by the Board in each of the several districts established by it, due consideration being given to costs of production and distribution in the respective districts. In short, the prices set were to be negotiated, not arbitrary, prices and based largely on the economic law of supply and demand.

In 1938 the Supreme Court of Pennsylvania affirmed the authority of the Milk Control Board to fix prices. At the 1940 meeting, the State Grange declared itself "opposed to compulsory price-fixing of all commodities including milk."[14] Gradually, as the law was administered more and more on a consulting basis, farmer and dealer opposition to it lessened; consumers had favored it from the beginning. The policy of price-fixing, however, was still a hotly debated issue in 1940.

UNITED STATES DEPARTMENT OF AGRICULTURE

This great arm of the federal government, which now reaches into every rural community and profoundly affects the economic and social life of every farm family, had a humble beginning. The first President, George Washington, recommended to Congress, December 7, 1796, the appointment of Agriculture Boards "charged with collecting and diffusing information, and enabled by premiums, and small pecuniary aids, to encourage and assist a spirit of discovery and improvement."[15] A similar recommendation was made two decades later by Elkanah Watson, the "father of county agricultural societies." Neither recommendation was enacted into law, the proposed action being judged by Congress to be unconstitutional.

In 1839 Congress appropriated the modest sum of $1,000 "for the collection of agricultural statistics, investigations for promoting agriculture and rural economy and for the procurement of cuttings and seeds for gratuitous distribution among the farmers." This appropriation was expended under the direction of the United States Commissioner of Patents. The first Patent Office report on agriculture was in 1839. The main agricultural functions of the Patent Office were the collection of statistics and the free distribution of seeds; but the annual reports contained many informative letters from farmers in all parts of the country describing local agricultural conditions and practices.

Pennsylvania was influential in securing the establishment of the United States Department of Agriculture. In January, 1852, the State

Agricultural Society appointed a committee to memorialize Congress for the establishment of a Federal Agricultural Bureau.[16] The time-honored Philadelphia Society for Promoting Agriculture took similar action.[17] Frederick Watts of Cumberland County was a Vice-President of the National Agricultural Convention held at Washington in July, 1852. This body organized the National Agricultural Society, which pressed for recognition of agriculture in the federal government by the establishment of an agricultural bureau.[18] The constitution of the National Agricultural Society provided for a National Board of Agriculture, the members of which were to be appointed by the respective state agricultural societies. The Pennsylvania State Agricultural Society appointed Frederick Watts of Carlisle, John H. Ewing of Washington, and Hugh N. McAllister of Bellefonte to serve on this Board.

Responding at last to this appeal, in September, 1861, Congress established a Bureau of Agriculture in the Department of the Interior. This soon gave way to the United States Department of Agriculture, which was created by an Act signed by President Abraham Lincoln on May 15, 1862. The first Commissioner of Agriculture in charge of the Department was Isaac Newton, a progressive farmer of Delaware County, Pennsylvania, who was promoted from his former position of chief of the agricultural section of the Patent Office. He laid the foundation for the present broad program of service of the Department, including not only the gathering of statistics and the dissemination of information on improved methods of farming, but also the prosecution of research. Frederick Watts of Carlisle, Pennsylvania, was appointed Commissioner of Agriculture in 1871. On February 9, 1889, the long campaign of the Grange and other rural organizations for full recognition of agriculture in the national government came to fruition; on that date President Grover Cleveland approved an Act raising the Department to executive rank under the administration of a Secretary of Agriculture who was a member of the President's cabinet. Commissioner of Agriculture Norman J. Coleman became the first Secretary of Agriculture.

Thereafter the Department had a phenomenal growth—from nine staff members and an appropriation of $60,000 in 1862, to 5,134 staff members and a budget of $7,000,000 in 1905. Its functions were regulation, education, and research. At some points its program needlessly duplicated the programs of state agencies but, for the most part, it performed a very useful service. The results of its research were translated into improved farm practice and its regulatory function was exercised to the great advantage of agriculture and the public. Prior to 1933, however, the United States Department of Agriculture was of little concern to most Pennsylvania farmers.

GOVERNMENT REGULATION OF AGRICULTURE, 1917-1933

World War I brought regimentation of agriculture as well as of industry, and price fixing of certain farm products. The need for a greatly increased supply of food not only for feeding our armies in Europe but also to meet the military and civilian needs of our allies led to the passage of the drastic Food and Fuel Control Act of August 10, 1917. This gave the President emergency power to control the food supply of the nation by fixing prices of farm products, licensing all handlers of food, limiting the production of certain commodities, and regulating trade practices.

The National Food Administration, of which Herbert Hoover was Controller and H. Howard Heinz of Pittsburgh, Pennsylvania, State administrator, immediately announced the control of wheat, flour, and bread. It set a price of $2.20 a bushel for the 1917 crop and $2.39 for the 1918 crop. This high price encouraged so much additional seeding of wheat that the 1918 crop of 921,000,000 bushels was adequate for war-time needs.[19] During the war wheat growers who were unable to secure satisfactory services from country dealers or commission men, sold it in carload lots through the Food Administration Grain Corporation, which undertook to find a market for it at a commission charge of one per cent.

The great expansion of wheat acreage in western states under the stimulus of these high prices had disastrous repercussions after the war. "For the first time in America," said the Pennsylvania Department of Agriculture, "there is a proper market for every ounce of grain, and for the first time in America, the farmer is receiving ten per cent of the price the consumer is paying for a loaf of bread. . . . On the 1916 crop of wheat, the farmer received an average of $1.40 to $1.60 per bushel, while . . . the flour made from this wheat was selling at $14.50, f. o. b. mill. With the Food Administration in control, the price of flour was $10.50 per barrel, while price to the farmer for his wheat, is $2.20 f. o. b. Chicago."[20]

Hog production, naturally, responded more quickly to government stimulation than other livestock; there was comparatively little effect on beef. The government pegged the price of pork at $15 to $19 a hundred pounds for hogs ready for the market. In 1918 it commandeered sixty per cent of all cold storage butter for army and navy use, thereby bringing about a sharp advance in price. It sought to stabilize the market price of wool and some other farm commodities.

At the close of the war, government price support was withdrawn, leaving farmers again under the operation of the law of supply and demand. The United States Food Administration was terminated in June, 1919, and the Federal Grain Corporation ceased to purchase wheat in May, 1920. Although probably necessary as a war-time emergency measure, this experience with government regulation of agriculture was not altogether reassuring. In 1918 Herbert Hoover admitted, "The weather is our real and final food controller." *National Stockman and Farmer* commented, "Farmers, like others, have to learn that statute laws alone cannot change fundamental economic laws. No legislation can put a higher price on commodities than the people who use them are able and willing to pay. No legislation can compel farmers to produce foodstuffs at a loss so that others may have them at a low price."

In 1922 the editor of *National Stockman and Farmer* prophesied, "We venture to predict that experience will show there is no such a critter as a temporary subsidy."[21] Time has verified this prophecy. Widespread dissatisfaction among western farmers after the government subsidy was withdrawn led to the introduction of many "farm relief" measures in Congress between 1921 and 1927. The Philadelphia *Public Ledger* generalized very wisely in 1923: "Somehow he (the President) must get the farmer to understand that he cannot draw a monthly pension, have the Government milk his cows and cut his fence rows for him while he sits at ease in Zion. . . . The farmer is 'hipped' on the subject of his own troubles and . . . is in danger of becoming a confirmed hypochondriac."[22] This stricture could be applied to only a very few farmers in the State that the *Ledger* served.

The McNary-Haugen Bill was before Congress from 1923 until 1928. It was passed in 1928, but was vetoed by President Calvin Coolidge and did not become law. This was a price-fixing and price-support measure. It was intended to maintain the prices of basic farm commodities at a level high enough to pay the farmer cost of production plus a reasonable profit and to avoid dangerous agricultural surpluses. The National Grange and other farm organizations supported the measure as "an effort to give the equivalent of the tariff protection enjoyed by products of which there is no exportable surplus to producers of agricultural staples of which there is an exportable surplus." Another hotly-debated farm-relief measure, the Export-Debenture plan, failed to pass.

In 1927 the Supreme Court of the United States rendered a decision that price fixing by government is illegal. It ruled, "The power to fix prices, whether reasonably exercised or not, involves power to control the market and to fix arbitrary and unreasonable prices. The reasonable price fixed today may, through economic and business changes, become the unreasonable price of tomorrow."[23]

The first farm-relief law was the Agricultural Marketing Act of June 15, 1929, which established the Federal Farm Board. The Board was expected to be a "mechanism for the orderly production and marketing of farm products." Its principal function was to foster cooperative marketing and to stabilize prices "so that the business of agriculture will be placed on a basis of economic equality with other industries." The Board gave financial aid to existing cooperatives and promoted the organization of new cooperatives. Its activities were mainly in the West and South, since Pennsylvania had few marketing cooperatives at that time.

Those who had expected the Federal Farm Board to work economic miracles were disappointed. It did make a contribution through its stimulation of the cooperative movement, but its price-stabilization program, mainly by the purchase and storage of surpluses, was a flat failure. Its wheat-stabilization program was aptly characterized as "Federal-subsidized speculation." In 1931 it recommended that every third row of cotton be plowed under in order to reduce the mounting surplus of that commodity. The Board was abolished in 1933, after losing $350,000,000 of public funds.

AGRICULTURAL ADJUSTMENT ACT

The advent of the administration of President Franklin D. Roosevelt in March, 1933, amid the deepest economic gloom in the history of the nation, marked the beginning of many revolutionary and highly controversial "New Deal" programs. One of the first actions of his administration, on March 6, 1933, was to proclaim a national bank holiday to permit examination of the soundness of individual banks preliminary to their gradual reopening. The entire economy of the nation was put under government control through the National Recovery Administration. In effect, industry agreed to shorten hours of labor and increase wages in exchange for federal aid in regulating and stabilizing prices. The "Blue Eagle" label, symbol of the NRA, and the slogan, "We do our part," were supposed to be displayed at every place of business. Violators of "fair practice codes" developed by major industries were subject to prosecution. The National Recovery Act was invalidated by the United States Supreme Court on May 27, 1935.

In 1933 the federal government sought to substitute work relief for dole relief with the 28,000,000 persons then on relief rolls, by means of the Works Progress Administration, and to finance the construction of buildings, highways, and community projects by means of the Public Works Administration. The Civilian Conservation Corps, created in April, 1933, undertook to provide useful employment for idle youth, especially in the conservation of the natural resources of soil, forest, and water. In November, 1933, there were 20,000 CCC workers in camps throughout Pennsylvania. The National Youth Administration, established in June, 1935, was intended to give part-time employment and financial assistance to high school and college youth. These and other attempts of the federal government to "prime the pump" of the depressed economy were accompanied by a large measure of government control and a corresponding loss of private initiative.

One of the major objectives of New Deal legislation was recovery in agriculture. The Agricultural Adjustment Act became law on May 12, 1933. It gave the Secretary of Agriculture power to take out of production enough land to eliminate the piled-up surpluses of basic crops, to reduce the number of swine, and to buy surplus dairy products for the use of those on relief. Under it individual farmers entered into contract with the federal government to reduce their acreage in specified surplus crops in return for "benefit payments." These were financed by processing taxes on the commodities concerned; theoretically, at least, the cost of the program was borne by all consumers.

The year 1933 marked a turning point in the history of the nation. A long step was taken then toward a planned economy and a socialized agriculture. Except for a brief period during World War I, the policy had been for the government not to interfere with the operating and marketing problems of farmers; success in farming, as in other business enterprises, depended almost wholly on the competitive ability and personal initiative of the individual farmer. After 1933 the federal "action programs" impinged more and more on the farmer's freedom of choice. The point of view of the government was stated by Rexford G. Tugwell: "If the government fails to manage the prices of agricultural commodities other interests will. Prices do not set themselves, they are set by administrative decision." This was a complete abrogation of the principle of an open market operating under the economic law of supply and demand, which had prevailed heretofore.

The emergence of farmers among the pressure groups that demanded government aid was a new and disturbing factor in American life. The common justification for this action was that the welfare of the whole nation was promoted when agriculture prospered. It was argued, also, that industry had been the recipient of government aid for many years through the operation of tariff laws and that farmers had a right to demand "their share" of federal largess. Proponents of New Deal measures declared, "This policy of private initiative . . . has not always worked out in the past either to the advantage of the individual farmer or to that of the Nation. . . . It has . . . not maintained prices and income or given security to the mass of the farmers. . . . Farmers in the early 1930's demanded a new approach. They . . . got legislation . . . that represented a sharp departure from previous policy. It was based on a philosophy of group action. It specifically authorizes the use of governmental power to restrain or modify the action of the individual, both in the production and in the marketing of agricultural products."[24] The complex programs developed by government to achieve these ends involved many drastic and changeable crop-control devices and raised many new problems for farmers. Of far greater importance, however, was their influence on the farmers' point of view.

The Agricultural Adjustment Act of May 12, 1933, more commonly designated the AAA or "Triple A," declared that wheat, cotton, corn, rice, tobacco, swine, and milk with its products are basic commodities and subject to production control for the purpose of raising their market price to "parity"—the average level of their purchasing power during the five-year period 1909-1914. Later, nine other commodities, including potatoes, were added to this list. Funds derived from a processing tax were to be used to pay farmers to raise reduced amounts of these commodities. Crop or livestock reduction was to be voluntary, but if a farmer did not "cooperate" he was not eligible to receive benefit payments.

Wheat was the first basic commodity for which a program of adjustment was announced. Adverse weather conditions in 1933 obviated the necessity of plowing under part of the wheat acreage as had been planned. The adjustment program developed as a plan to pay a farmer approximately thirty cents a bushel on an acreage allotment calculated to be about eighty-five per cent of the acreage grown by that farmer during the base period of 1928-1932. For the nation as a whole, this was expected to achieve a reduction of 12,000,000 acres. A processing tax of thirty cents a bushel was imposed to provide funds for benefit payments.

The AAA program of 1933 also called for the slaughter of 4,000,000 young pigs of 25 to 100 pounds each and 1,000,000 piggy sows in order to reduce the production of pork and so bring the price of hogs up to its pre-war level. Approximately 6,000,000 pigs were killed under this program; they were processed by the government and the meat given to unemployed families. Many farmers viewed this slaughter with dismay; it was widely condemned as a false "policy of scarcity" at a time when millions of people in this and other countries were without an adequate supply of food.

The operation of the "Triple A" in Pennsylvania was conducted by federal employees and by State, county, and community committees of farmers. At the inauguration of the program the federal Secretary of Agriculture called upon state Directors of Agricultural Extension to serve as state administrators and upon County Agents to serve as local supervisors of the program. This was done in some states, but not in Pennsylvania. Officials of The Pennsylvania State College wisely decided that the enforcement of this law, as well as of other laws, federal and State, was not properly a function of an educational institution. The Agricultural Extension Service, however, supplied full information concerning all federal programs as they developed, and helped to set up local organizations to administer them.

RESPONSE TO "TRIPLE A" IN PENNSYLVANIA

The "Triple A" program of 1933 had meager support from Pennsylvania farmers, chiefly because they were not in sympathy with the principle involved. Most of them were not willing to surrender their freedom of choice in order to qualify for benefit payments. In their opinion, to be paid for crops they did not produce was not common sense. Especially repugnant to them was the program for killing young pigs and paying farmers for doing so. A German farmer of Bucks County characterized the planners at Washington as *dindaschleckers,* or ink-lickers, "impractical theorists who ultimately will be forced to lick up their own ink." The Plain People would have nothing to do with the program on a contractual basis; they might agree verbally to reduce their acreage, even of tobacco which was a major item in their profits, but they refused to sign contracts and to accept payments for acreage reduction.

Few Pennsylvania farmers participated in the AAA wheat reduction program of 1933. In October of that year *Pennsylvania Farmer* reported, "About five per cent of Pennsylvania farmers signed contracts to reduce wheat acreage. They represent about ten per cent of the area in wheat in 1932. Probably there has been no actual reduction in wheat area in this state, many who did not agree to reduce having increased their acreage. . . . Many [farmers] refused to disturb existing rotations and others were deterred by the nature of the contract."[25] Total benefit payments in 1933 amounted to only $425,000; they were paid mostly to tobacco growers.

The federal corn-hog program for 1934 proposed a reduction of corn acreage on individual farms of at least twenty per cent of the acreage of the three preceding years, with a corresponding reduction in the number of litters of hogs farrowed. In 1935 the State Corn-Hog Board announced that in order to qualify for benefit payments farmers would have to reduce their 1935 corn acreage and the number of pigs produced for market at least ten per cent below the 1931-1933 base. The Commissioner of Internal Revenue ruled that the processing tax applied even in the case of the producer who slaughtered his own hogs and sold more than 300 pounds of the products. The tax was $2.25 a hundredweight. This ruling roused much resentment among Pennsylvania farmers, most of whom raise only a few hogs, primarily for family use, and sell part of the pork locally. Said one disgrunted farmer, "In December, 1933, I sold five hogs to a butcher for seven cents a pound dressed, making a total of $56.25. A federal man came around and told me I would have to pay $23.42 in processing tax. If that is right, then anything is. I have refused to pay." In January, 1934, the rule was modified so that a farmer could sell up to 1,000 pounds of pork without paying a processing tax.

Another reason why Pennsylvania farmers did not feel kindly toward the Triple-A program was its inequity as applied to this State. In 1934 Pennsylvania consumers paid a processing tax of $8,029,498, but Pennsylvania farmers received benefit payments of only $866,423. According to *Pennsylvania Grange News,* "The Federal program benefits southern and western states chiefly. They receive from $4.68 to $23.38 in compensation payments to farmers for each dollar of processing tax paid, or an average of $7.22. Pennsylvania receives only ten cents. Texas, for example, pays approximately the same amount of processing tax as Pennsylvania but receives more than sixty-two times more AAA payments than Pennsylvania."[26] To which the government might retort, "That is because fewer Pennsylvania farmers have been willing to qualify for benefit payments." Of the $179,000,000 paid by the government to farmers for reducing production up to April 1, 1934, only $630,000 was paid to Pennsylvania farmers whereas Texas farmers received $47,000,000.

During the year 1934, Pennsylvania farmers received $1,200,000 in benefit payments, mainly for reduction of tobacco acreage. Some who were opposed to the AAA in principle began to accept benefit payments in practice. A few even short-changed the government without compunction. One farmer who had signed a corn-hog contract confided to his neighbor, "I have bought more fertilizer and will try to raise as much corn on ten per cent less acreage and will raise enough hogs to eat it."

By the end of 1935, the national surpluses which it was the purpose of the "Triple A" to reduce had begun to disappear. It was the judgment of many, however, that this favorable circumstance was due more to unfavorable weather than to the program. The severe droughts of 1933 and 1934, especially in the western states, probably did more to reduce crop surpluses than AAA measures. "May 12th [1934]," commented *Pennsylvania Grange News,* "was the birthday of the 'A.A.A.' And it so happened that this was the day that Nature chose to deluge the Atlantic Seaboard with fine particles of soil picked up from as far West as Nebraska. . . . The mockery of . . . this dust storm has a cosmic quality. . . . Nature merely was broadcasting the fact that a disastrous drought in the wheat and corn belts had done more to discipline the farmer and his markets than the most elaborate machinery ever devised by legislation."[27] In August, 1935, the editor of *Pennsylvania Farmer* commented in similar vein: "In the presence of the third consecutive wheat crop below the current needs of the nation the Agricultural Adjustment Administration continues its policy of reduction, taxation and everything else which it groups under the deceptive title of 'adjustment.' The would-be regulators have retreated from a 25 per cent to a 15 per cent reduction, and finally to a 5 per cent reduction, of acreage—which means practically nothing in comparison with what Nature has done in recent years and may do again."[28]

In 1935 potatoes were added to the list of basic commodities under the AAA program. An acreage allotment and a marketing quota were assigned to each state, county, and farmer. If a farmer marketed in excess of his quota, he was liable to a tax of forty-five cents a bushel on the excess. Pennsylvania growers were practically unanimous in opposition to this measure as discriminatory against small producers in this, a deficit State. The potato control program was generally ignored, and was repealed in 1936.

During the federal fiscal year ending June 1, 1935, Pennsylvania farmers collected $1,676,409 under the AAA control program. Of this, tobacco in eleven counties accounted for $938,022, wheat in forty-eight counties for $237,384, and the corn-hog program in fifty-seven counties for $501,002. Approximately half of the benefit payments, or $837,379, went to Lancaster County, mainly for tobacco.[29] In February, 1936, *Pennsylvania Farmer* reviewed the situation: "An analysis of farm income [in Pennsylvania] shows that in the past 30 months farmers of this state got 99½ per cent of their cash income from sale of farm products and only one-half of one per cent from AAA rental and benefit payments. . . . The fact that so insignificant a part of our farm income came from the federal government explains the lack of enthusiasm our farmers have shown for the various plans emanating from Washington."[30] In some western and southern states more than fifteen per cent of the cash income of farmers was derived from benefit payments.

Although participation by individual farmers in federal control programs was voluntary, not compulsory, these programs often were put into effect when a majority of farmers were opposed to them. Federal authorities conducted national and state referenda to determine whether a certain program should be applied. The issue was decided on the basis of the majority of votes cast, which always was a small proportion of the total number of farmers affected and eligible to vote. Most farmers, especially those opposed to the program in principle, did not vote. In the referendum on the wheat adjustment program of 1935, only 3,879 of the 85,000 eligible Pennsylvania farmers voted.[31] In this, as in other referenda, it was a mandate of the minority. Farmers who were getting paid for cooperating did not vote to dispense with government bounty; others did not participate in the referenda.

On January 6, 1936, the United States Supreme Court, by a six-to-three decision, declared the Agricultural Adjustment Act unconstitutional. The Court pointed out, "The Act invades the reserved rights of the states. It is a statutory plan to regulate and control agricultural production, a matter beyond the powers delegated to the federal government. . . . Congress has no power to enforce its commands on the farmer . . . [and] may not indirectly accomplish these ends by taxing and spending to purchase compliance. . . . The power to confer or withhold unlimited benefits is the power to coerce or destroy . . . the asserted power of choice is illusionary."

So passed one of the most controversial of Congressional enactments relating to agriculture. During the two and a half years of its operation it paid $1,129,000,000 to farmers and collected about $1,000,000,000 in processing taxes. Its supporters argued that the rise in prices of farm commodities in 1934 and 1935 and the enhanced purchasing power of the farmer were due primarily to the operation of this Act. Its opponents attributed most of these gains to short crops due to unfavorable weather. They contended, moreover, that the program of scarcity inaugurated by the AAA, especially its destruction of crops and livestock, was contrary to the American tradition of abundance; that government regulation of agriculture is obnoxious to most farmers, who have been the bulwark of the free enterprise system; that benefit payments are, in effect, a government subsidy to farmers which, if continued beyond the emergency period, would tend to make these hitherto highly independent citizens more and more dependent on government and less and less on personal initiative. The weight of the argument seemed to be on their side.

THE AGRICULTURAL CONSERVATION PROGRAM

The jubilation of opponents of government regulation of agriculture when the "Triple A" was tossed into the discard by the Supreme Court was of short duration. In February, 1936, a substitute measure, the Soil Conservation and Domestic Allotment Act, became law. This was an adroit plan to secure practically the same measure of government control as had existed under the AAA, but indirectly and within constitutional limitations. The emphasis was shifted from direct crop and livestock reduction, which was generally unpopular with the public, to soil conservation. Direct appropriations from the federal treasury replaced processing taxes, which the Court had specifically outlawed. Farmers now were to be paid, not directly for reducing crops or livestock production, but indirectly for reducing their acreage of soil-depleting crops—as wheat, corn, and tobacco—and devoting the land so released to soil-improving crops—as grass and legumes. They also were to be paid for following certain government-approved soil-building practices.

This sugar-coated pill of government regulation of agriculture seemed to be somewhat more palatable to Pennsylvania farmers than the strong medicine of the AAA, although the principle involved was the same. In August, 1936, it was reported, "To date 35,000 Pennsylvania farmers have filed work sheets under the program. During the next six to eight weeks local committees will check over these work sheets, determine to what extent each signer has complied with the provisions of the Act and assign the allotment [Federal funds] to which he is entitled."[32] By the end of 1936, more than 38,000 farmers had made application for government largess. In 1937 the number increased to 70,000.

Conscientious farmers had to decide whether they were justified in accepting federal subsidies for good farming practices that they had planned to do anyhow as a matter of self interest. In 1936 the State Committee announced, "The standards of the program are the methods of good farming. . . . The program really is an offer by the government to bear some of the cash cost of improved farming methods. Each farmer will choose the approved methods especially suited to his farm. The object of the program is to reduce the effects of soil erosion, and to conserve and improve the fertility of farm land. . . . Payments will . . . be made to farmers who use approved soil-building practices. [If] their regular farm practices meet the standards set by the committee . . . they may qualify for remuneration without any change in their system of farming."[33]

Among other good farming practices, farmers were eligible to receive benefit payments for applying fertilizer and lime to new seedings of grass, which most of them had been doing for years. Those who had a considerable area in pasture were paid for keeping it in pasture. Payments were made for new seedings of alfalfa, red clover, and other legumes; for reforesting steep or rocky land; for improving the farm woodlot. In tobacco-growing counties payments were made for diverting up to twenty-five per cent of the land normally in this crop into soil-conserving crops; the payment was at the rate of three cents a pound for the normal yield of tobacco to an acre. A cropping plan for every cooperating farm was made by a federal employee.

In 1937 the word "reduction," which was unpopular with consumers, was replaced by the word "goals." National referenda were held annually on whether to continue government control of certain crops or livestock. As under the AAA, only a small proportion of eligible farmers voted. In 1937, of the 64,000 Pennsylvania farmers who had been accustomed to raise 100 or more bushels of potatoes annually, only 1,810 voted in the referendum. The program was administered by federal officials and by state, county, and community committees of farmers.

Benefit payments for diverting land from soil-depleting to soil-conserving crops averaged about ten dollars an acre. A dollar an acre was paid for continuing to keep land in soil-conserving crops. The cash income of Pennsylvania farmers in 1936 from the sale of crops and live stock was $238,550,000; in addition, benefit payments totaled $2,427,000. In 1937 benefit payments amounted to $2,586,000, an average of $47 a farm as compared with an average of $936 a farm in North Dakota.[34] The soil-building practices for which payments were made that year were applied on 882,027 acres, of which 419,077 acres were new seedings of clover and timothy, 111,084 acres new seedings of alfalfa, 199,817 acres limed, and 36,586 acres of pastures improved.[35]

Most Pennsylvania farmers still were opposed to federal subsidies in principle, but many accepted them. On September 28, 1936, the State Council of Farm Organizations declared, "We are opposed to any system of price-fixing of farm commodities. . . . Rather than be paid for not raising wheat, corn, or pigs when there is a world shortage of food, or receiving taxpayers' money for carrying out practices of good farming and for doing what they should do anyway, the Council feels that the final sound plan for rehabilitating agriculture has not yet been tried."[36] In 1937 the Master of the State Grange said, "I am convinced that a large percentage of our people are opposed to the Soil Conservation Program and that also a large majority of those who have signed up do so on the assumption that if the money is to be spent they might as well get it while the getting is good, for if they do not some one else will."[37]

The Soil Conservation and Domestic Allotment Act of 1936 gave way to the Agricultural Adjustment Act of February, 1938. This continued and extended powers previously granted to the Secretary of Agriculture. Under it agricultural adjustment was to be secured by acreage allotments, marketing quotas, and commodity loans, but primarily by limiting production. Parity payments were made to farmers for diverting land from soil-depleting crops to soil-conserving crops. Producers of wheat, corn, cotton, tobacco, and rice could obtain from the Commodity Credit Corporation loans designed to put a floor under the prices of these commodities when the prices went below a certain percentage of parity. Commodity loans were at the rate of fifty to seventy-five per cent of parity. The "ever-normal-granary" program for wheat was an attempt to duplicate in this generation what Joseph did in Egypt many centuries ago. Acreage allotments, as determined by the Secretary of Agriculture, were assigned by states, counties, and individual farms. Marketing quotas were similarly assigned. The penalty tax for marketing more than the quota of wheat or corn was fifteen cents a bushel.

The Agricultural Marketing Agreement Act of 1938 enabled organizations of producers and distributors to establish centralized marketing systems: "The present marketing-agreement programs simply extend the cooperative marketing principle throughout an industry or an area. . . . A program is initiated only on the demand of the industry and is put into effect only on a favorable vote of two-thirds of the producers. . . . It combines voluntary and regulatory control to govern the handling (and therefore the handlers) of the commodity."[38] In Pennsylvania this Act was applied only to the marketing of milk. In general, it provided for a producer-dominated administrative agency and for the issuance by the federal government of special regulations to control the volume, grade, and price of the commodity.

Participation of Pennsylvania farmers in federal programs for crop and livestock control continued to increase. In 1938 there were 73,639 farmers who signed up under the Agricultural Conservation Program. The largest number was in Lancaster County, 3,774; Crawford County, 3,088; Mercer County, 2,269. In 1940, federal parity payments in this State amounted to $6,679,000, with a total cash income from marketings of $273,143,000.[39] Most Amish farmers continued steadfast in their refusal to accept benefit payments, not only because of their non-conformist religious conviction but also because they did not believe in the principle involved. They asked these searching questions:

"Is it right for farmers to accept benefit payments when they have not earned them?

"How can we have agricultural surpluses when so many people in the world do not have enough to eat?

"Do not farmers have to pay their share of benefit payments in taxes?" A few, however, ultimately succumbed to the insidious lure: "If others are getting paid for good farming, why not I?" The State Grange did not relax its opposition to the "'national socialization of land,' which, it was asserted, was inherent in the Agricultural Adjustment Act."[40]

A study by the Pennsylvania Agricultural Experiment Station of the participation of Centre County farmers in federal programs from 1936 to 1941 led to these conclusions: "Farmers look upon the A.A.A. program from an individualistic standpoint. . . . Participation usually depended on whether the farmer figured that the payment was sufficient to more than offset the effort to qualify for them. While political views seemed to hinder participation in some instances, not enough such cases were encountered to have an appreciable effect on averages."[41]

An unbiased appraisal of the Agricultural Adjustment Program is that the pegging of prices by government and the stimulus of benefit payments resulted in considerable temporary advantage to farmers at a time when they were submerged in pessimism and effected marked progress in soil conservation, but that the long-term disadvantages may have outweighed the temporary benefit. Among these were impairment of the export market by raising domestic prices above the world level; continuing to maintain some farmers on submarginal land; and—by far the most important—the beginning of government regimentation of agriculture. Continuance for purely monetary reasons of participation in programs that they believed to be unsound in principle might gradually undermine the objection of farmers to the principle itself. If so, the temporary advantage was secured at too heavy a cost.

FARM CREDIT

The federal government has become one of the principal sources of credit to farmers who, for many years, were handicapped in securing it from local sources. The Federal Farm Loan Act, commonly called the Rural Credits Law, became operative July 17, 1916. Its primary purpose was to enable farmers to borrow money on farm mortgage security at a reasonable rate of interest and for a relatively long period. The interest rate on farm mortgages is an important item of cost to many farmers, especially young men who are climbing the ladder from tenancy to ownership. Prior to the passage of this Act the principal agencies making farm loans were national banks (through trust companies), state banks, life insurance companies, and individuals. The average rate of interest on mortgages in 1917 was 5.4 per cent. The interest rate on mortgages handled by the Federal Farm Loan Board did not exceed 4.5 per cent, which was a considerable saving.

The Rural Credits Law operated through regional land banks and joint-stock land banks. The Federal Land Bank of Baltimore and the joint-stock land banks which served Pennsylvania farmers not only saved them interest money but also helped to protect commercial banks from frozen loans. They enabled farmers to refund short-term mortgages on a long-term non-callable basis and so gave them greater security. It is evidence of the confidence of the Federal Land Bank of Baltimore in the integrity and permanence of Pennsylvania agriculture that it loaned an average of $22.84 an acre on land appraised at an average of $44.25 an acre.

Federal agricultural credit was expanded in 1923, when the Intermediate Rural Credit System was established. Intermediate credit banks made short-term production loans to farmers indirectly, through local commercial banks or through cooperative credit associations. On March 27, 1933, all agricultural credit agencies of the federal government, including the Federal Farm Loan Board, the Federal Farm Board, and certain functions of the Reconstruction Finance Corporation, were consolidated in the Farm Credit Administration. This was one of the most successful New Deal agencies for the benefit of agriculture. Its chief purpose was to aid farmers who were encumbered with debt, by scaling down their mortgage payments and interest rates. It prevented many foreclosures which otherwise would have been inevitable.

"The system established under the Farm Credit Administration provides in each of the 12 Federal Land Bank Districts for a Federal Land Bank, a Federal Intermediate Credit Bank, a Production Credit Corporation and a Bank for Cooperatives. . . . The Production Credit Corporations provide for the financing of production credit associations, which lend money to farmers for production purposes, the farmers' notes, together with adequate collateral, being taken in return for such credit. These notes are rediscounted with the Federal Intermediate Credit Banks of the respective Land Bank Districts. The Banks for Cooperatives makes loans to cooperative associations of producers of agricultural commodities for the purpose of processing and marketing such commodities and for the processing, handling and distribution of farm supplies."[42]

The East Central Production Credit Association was organized December 27, 1933, to make loans to farmers in the Second Land Bank District, which includes Pennsylvania and four adjoining states, for the purpose of financing the production of crops and livestock, as for spray material, fertilizer, and feed. The Association functioned through several local production credit associations which covered all the counties of the State. These corresponded to local cooperative banks; they made loans to their members at 4½ per cent interest. The loans were for periods of three to twelve months on crops, and for one to three years on livestock. They were secured by chattel mortgages on crops, livestock, and major items of equipment. Farmers were required to subscribe to stock of the local association before they were eligible for loans. In 1939 the Lancaster Production Credit Association reported that it had loaned $3,000,000 during the four-and-a-half years of its existence and had lost only $343 in bad risks.

The New Baltimore Bank for Cooperative Organizations, which was established September 27, 1933, served Pennsylvania. The Mushroom Growers' Cooperative Association, Kennett Square, Chester County, was the first farmers' cooperative to obtain a loan from this bank.[43]

In addition to long-term mortgage loans and short-term production loans, the Farm Credit Administration made emergency loans to farmers who had been hard hit by drought or other natural catastrophe. This was done through the Intermediate Credit System. The very severe drought of 1930 left some Pennsylvania farmers destitute. Until the spring of 1931 they were unable to secure loans from the drought relief fund of $45,000,000 set up by the federal government, because the State had no law which enabled them to offer chattel property as security for such loans.[44] The Chattel Mortgage Act of Pennsylvania became a law on March 24, 1931. Loans were limited to $400 a farmer. Such was the ingrained independence of Pennsylvania farmers at that time, however, that by May 7, 1931, only twenty-three had applied for loans.[45]

FARM RELIEF

The New Deal was a social as well as an economic and political revolution. The "under-privileged farmer" became the object of much solicitude by government. The Farm Credit Administration loaned funds to farmers who were good risks; it provided business credit, not relief. Other federal agencies made direct grants to distressed farmers or made loans on very easy terms especially to those who could not secure credit elsewhere. These activities must be appraised from a social as well as an economic point of view; they were primarily relief measures rather than credit agencies.

The initial federal farm relief agency was the Rural Rehabilitation Division of the Federal Emergency Relief Administration, established by Congress in 1934. The Resettlement Administration, which was set up in 1935, included this Division. Its announced purpose was "to make it possible for destitute persons eligible for relief in rural areas to sustain themselves through their own efforts." On July 22, 1937, this program was absorbed into the Farm Security Administration, which gradually broadened eligibility requirements until it became a lending as well as a relief agency.

The Farm Security Administration had three divisions—Rural Rehabilitation, Tenant Purchase, and Rural Resettlement. The Rural Rehabilitation Division assisted indigent farmers to reestablish themselves on the land by making them loans, adjusting their debts, and helping them to develop a farm and home plan by which the economic and social status of the family might, in time, be improved. Only those who were unable to secure credit elsewhere at reasonable terms were eligible. The loans were secured by chattel mortgages on the personal property of borrowers, and it was expected that ultimately they would be repaid.

Many "clients" of the Farm Security Administration were in default of payments. If the original loan proved to be insufficient, a supplemental loan might be made on the same terms. If a borrower could not even pay interest, he might be refinanced for another five years, back interest included. Some were given outright grants or relief money for sustenance until the farm could support the family. Up to March 1, 1940, the sum of $2,448,312 had been loaned to 4,616 Pennsylvania farmers.

Theoretically, the program of the Rural Rehabilitation Division was an extension of credit on very easy terms; in truth, it was primarily a relief measure and should be judged more in terms of social benefit than of economic achievement. Some of its beneficiaries were enabled to become self-supporting; others were human derelicts who lacked the ability or initiative to make a living on the land, even under favorable circumstances. The Administration set up County Farm

Debt Adjustment Committees; these counseled with both debtors and creditors on how best to work out the problem equitably. These committees forestalled many foreclosures and helped to refinance mortgages through the Federal Land Bank or other credit agencies.[46] One unfortunate feature of the program was that it tended to keep some submarginal farmers on submarginal land.

The Tenant Purchasing Division made loans to tenants or farm laborers for the purpose of enabling them to purchase farms under the Bankhead-Jones Farm Tenancy Act of 1937. Up to March 1, 1940, seventy-five such loans had been made in Pennsylvania, aggregating $440,000, the average loan being $5,867. Most of the loans were to young tenant farmers who aspired to be farm owners. A tenant farmer in Franklin County received the first loan under this Act; the loan of $5,424 enabled him to buy the farm on which he had been a tenant for fifteen years and to make some repairs to the buildings. Tenant purchase loans extended for forty years with interest at three per cent; the annual amortization payments and interest amounted to an average of 4.3 per cent on the principal. Additional loans secured by chattel mortgage were made for the purchase of equipment and livestock and for operation expense.

The Rural Resettlement Division undertook to move farm families from submarginal to good land and to finance the change. The success attending this operation was very limited; many of these farmers were on submarginal land because they had neither the ability nor the initiative to operate a farm successfully, even on good land. The Resettlement Division also established about 160 "homestead projects" in different parts of the country, some of which were supposed to be operated cooperatively by the residents. "Westmoreland Homesteads" in Westmoreland County was of this type; it was established in 1934 by the Subsistence Homestead Division of the Department of the Interior. It was intended to rehabilitate 100 families, mostly of idle coal miners who had been on public relief. The 1,800-acre tract was divided into homesteads of a few acres, and a low-cost house was erected on each by the government. The homesteads were sold to the beneficiaries under a long-term financing plan. Each family was supposed to make a subsistence; none did. Practically all of the Resettlement Division enterprises were a flat failure.

OTHER FEDERAL PROGRAMS

The Federal Surplus Commodities Corporation was established in November, 1935, "to promote the orderly marketing of commodity surpluses in domestic channels" and to relieve congested markets. In 1937 this agency purchased in Pennsylvania 54,000 bushels of apples, 2,000,000 pounds of milk products, 4,000,000 pounds of grapes, 330,000 dozen eggs, and 3,100 bushels of potatoes.[47] These were distributed to persons on relief rolls. It developed the food-stamp plan as a supplement to public assistance; persons on relief bought or were given these stamps which were used in exchange for food, chiefly dairy products, poultry products, meats, fruits, and vegetables. Food stamps also were used in the School Lunch Program.

Crop insurance, mostly of wheat, was tried by a few commercial insurance companies before 1930, but was soon discontinued; the risks were too great in proportion to the premium. In 1939 the Federal Crop Insurance Corporation began to issue policies on wheat. In that year 3,466 Pennsylvania farmers applied. Coverage included loss from drought, flood, wind, winter-killing hail, insects, and plant diseases. Insurance was written for not less than fifty nor more than seventy-five per cent of the "recorded or appraised average yield on the insured farm for a representative base period." The farmer was required to insure his entire crop, not just the part subject to the most risk, and to do this before seeding.[48] The premium was low; to insure seventy-five per cent of an average crop, it was equivalent to about the value of half a bushel of wheat an acre. The results of this experiment were so encouraging, especially in the West, that it seemed likely that federal crop insurance would be extended to other crops.

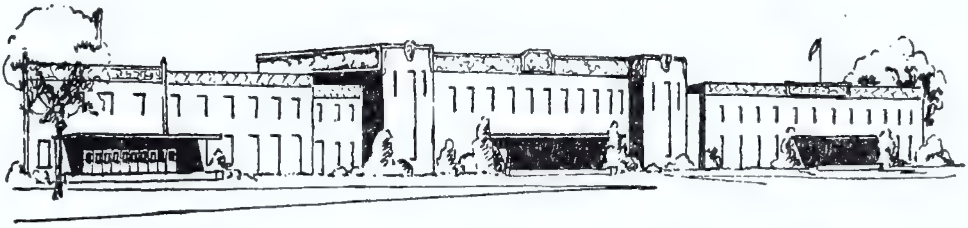
The Soil Conservation Service, organized in 1933, made an important contribution to the maintenance of soil fertility (Chapter 1). Several other of the "alphabet agencies" of the federal government touched the lives of farmers directly or indirectly.

In the judgment of many Pennsylvania farmers, some of the New Deal agencies for the benefit of agriculture were not an unmixed blessing. They did extend help when help was sorely needed, but they fostered a new conception of the function of government—that of a beneficent friend, a strong arm on which to lean. The idea of social security through government aid rather than through personal initiative began to take root. Some of the farmer's traditional freedom of choice had to be sacrificed in order to qualify for benefit payments. Government began to impinge more and more upon his life. He became more dependent not only upon federal bounty but also upon decisions made in Washington. Numerous federal employees appeared in every state and in every county to administer the action programs. The number of employees of the United States Department of Agriculture increased from 9,904 in 1911 to 33,298 in 1934, and to 107,712 in 1939.[49]

During the early years of the action programs, they often worked at cross purposes with each other and with state agencies, to the confusion of farmers. In 1940 a federal employee confessed, "Under the early Agricultural Adjustment Administration program, a farmer would have to take some of his land out of wheat in order to qualify for a benefit payment. But under the Resettlement Administration program, he might have to put land into wheat to qualify for a rehabilitation loan. But whether he took land out of wheat or left it in wheat it might blow away; therefore the Soil Conservation Service might advise him to restore the land to grass. The Bureau of Plant Industry . . . might be telling him not to plant wheat that year, because . . . the crop would be a failure unless there was a certain amount of moisture in the soil at seeding time. Yet he could borrow money for seed and, by merely attempting to grow some wheat, could qualify for a benefit payment on reduced acreage."[50] There was considerable wasteful duplication of the work of state agencies. In 1940 the State Grange noted the constantly expanding activities of the federal government in Pennsylvania and the duplication of government services in the agricultural field, which made for confusion, and added to the cost.

Only time can render a fair appraisal of the federal programs. Some of these, as the Farm Credit Administration, were of unquestioned benefit; others, as the Agricultural Conservation Program, were still being weighed in the balance in 1940. That they did help to pull agriculture through a serious economic crisis is beyond doubt; the main issue is whether the regimentation of farmers that they entailed and the dependence on government that they fostered were too great a price to pay. Whether for good or ill, according to one's personal political conviction, by 1940 the feet of American farmers seemed to be set on the path which might lead, ultimately, to a socialized agriculture. More than a century ago William West, an outstanding farmer of Delaware County, expressed the prevailing rural philosophy of his time: "He who would teach farmers to *help themselves* . . . would do more good, than he would accomplish by giving *alms* all the days of his life."[51]

XV



Main building, Pennsylvania State Farm Show, 1940

AGRICULTURAL ORGANIZATIONS

PRIOR to 1840 most rural communities were isolated; there was little cooperative effort among farmers except on an informal neighborhood basis. After 1840 improvements in means of transportation brought farmers from different parts of the county and State together more frequently. Meetings to discuss matters of common interest became more frequent. Joint action began to supplement individual action. Farmers began to work together in organizations; these, rather than individuals, became the spokesmen of Pennsylvania agriculture. By 1940 practically every farmer in the State was a member of at least one agricultural organization, and usually of several. Only the comparatively few Old Order Amish and Old Order Mennonite farmers, who were enjoined by their Church to be nonconformists, refrained from participation in organized agriculture.

Philadelphia Society for Promoting Agriculture

This time-honored group of gentlemen farmers, the first such society organized in the nation that persisted, was born in 1785. After a brief period of inactivity, it was revived in 1838 under the stimulating leadership of Nicholas Biddle as President and James Mease as Secretary. Between 1840 and 1855 it held monthly meetings and annual exhibitions that were, in effect, state fairs; they attracted visitors from many parts of the State and from neighboring states. Until the State Agricultural Society came into being, in 1851, it was the dominant educational organization of Pennsylvania agriculture.

The antagonism of working farmers to the Society, which had been in evidence since its organization, continued to restrict its usefulness. In 1846, *Farmers' Cabinet* of Philadelphia expressed the majority sentiment of its subscribers: ". . . How few among them are practical farmers . . . men who really till their grounds in the sweat of their own brow. . . . They are mostly gentlemen . . . who have acquired fortunes at mercantile or other lucrative pursuits; and who, wearied with the dull round of money-getting, have determined to improve agriculture by money-spending. . . . Their experiments in stock raising and otherwise, do not influence . . . the great body of farmers, who have not the means to follow their example."[1] It was all the more to the credit of these rural-minded gentlemen, therefore, that they sought to establish another type of organization that would better serve the interests of working farmers—the State Agricultural Society.

In 1847 the Farmers' Club was organized as an auxiliary to the Society; for many years membership in the Society was pre-requisite to membership in the Club. The chief activities of the Club were to make monthly inspection visits, in rotation, to the farms of its fourteen or fifteen members and to enjoy the bountiful dinner provided by the host of the day. It was the pattern by which many farmers' clubs were organized later by working farmers in the southeastern counties. In 1885 it was reported, "This club still exists, but has become a social organization."[2]

After 1860 the service and influence of the Philadelphia Society for Promoting Agriculture waned, largely because of the more vigorous activity of other organizations which it had been largely instrumental in establishing, such as the State Agricultural Society, the State Board of Agriculture, and the State Agricultural College. In 1855 this decline was recorded: "Organized in 1785, . . . it included among its members most of the prominent American agriculturists and many of the European agriculturists of the day. As . . . new societies sprang up in this and in other States, it lost its national character; and when, mainly through the exertions of its members, the Pennsylvania State Society was organized, the circle of its immediate influence became further contracted. . . . Its functions are, therefore, chiefly those of a local institution . . . the prolific mother of American agricultural organizations, although now on the verge of three score years and ten, enjoys an active and vigorous existence"[3] Thereafter the Society continued to hold sparsely-attended meetings and to publish its proceedings in current farm journals. Its last exhibition was held in 1855. In 1932 the Society resumed its early practice of granting citations to individuals in recognition of distinguished service to agriculture. On February 11, 1935, it observed its one hundred and fiftieth anniversary with appropriate ceremonies.

STATE AGRICULTURAL SOCIETY

This first State-wide organization of *bona-fide* farmers served agriculture effectively for many years. It was a creation of the Philadelphia Society for Promoting Agriculture. In 1794 that Society appointed a committee to memorialize the General Assembly "for establishing a State Society, for the promotion of agriculture." The committee, consisting of John B. Bordley, George Clymer, Timothy Pickering, Richard Peters, presented this petition to the legislature, which ignored it.[4] Nearly a generation later the Society again took up the issue. The minutes of its meeting of November 5, 1845, contain this item: "On motion of Dr. Elwyn, a committee of seven members was appointed for the purpose of ascertaining the disposition of agriculturists in different counties of the state on the subject of establishing a State Agricultural Society." After a lapse of four years the committee reported that the results of its canvass were favorable. The minutes of the meeting of December 5, 1849, record, "The President appointed a committee of six, of which James Gowen is Chairman, to take steps toward the formation of a State Agricultural Society."

On February 6, 1850, the Philadelphia Society authorized the publication of "An Address to the Farmers of Pennsylvania"; this was signed by A. L. Elwyn, Samuel C. Ford, A. S. Roberts, and J. P. Wetherill. It advocated the establishment of a "State Institution, through the medium of which Farmers can have a free interchange of opinion with each other upon the best means of promoting improvement in the theory and practice of Agriculture, and the opportunity of exhibiting annually, at designated localities, their stock and implements, with the products of their fields and orchards. . . . It is recommended . . . to hold a Farmers' Convention at Harrisburg, on the third Tuesday of January, 1851, to which every county is hereby invited to send delegates, for the purpose of forming a State Agricultural Society."[5]

The convention met on January 21, 1851, at the State capital. Attendance exceeded expectations; there were 358 delegates from fifty-five counties. The largest delegations were from Dauphin County (62), Philadelphia city and county (28), and Lancaster County (26). The convention adopted a constitution and memorialized the General Assembly to grant it a charter and an appropriation of $2,000 a year, which was done. It was incorporated on March 29, 1851. Annual dues were set at $1.00 and life membership at $10; later, annual dues were raised to $2.00 and life membership to $20, ultimately (1884) to $50. Frederick Watts of Cumberland County was elected the first President. It was provided that County Agricultural Societies be established as auxiliaries to the State society, to keep a record of "Agricultural statistics; the pedigrees of the various kinds of stock, . . . and the improvement of Agricultural in general," and to report this information to the State society before the annual meeting each January.[6]

This was an auspicious beginning. The first exhibition was held at Harrisburg on October 29-31, 1851, and State fairs were held thereafter for many years. At the annual meeting on January 18, 1853, a resolution was passed favoring the establishment of the Farmers' High School, now The Pennsylvania State University; the Society contributed $10,000 for this purpose.[7] For several years the Society was dominated by gentlemen farmers, as Frederick Watts of Carlisle, James Gowen of Philadelphia, and Hugh McAllister of Bellefonte; not until after 1870 did many working farmers participate in it actively. The early meetings were replete with flowery addresses and formal banquets, but gradually more practical discussions prevailed.

The State Agricultural Society was at the zenith of its power about 1855. In January, 1852, only a year after it had been organized, the membership was 2,090. In March, 1854, the Secretary reported that the members numbered 6,000; and he anticipated "that by another year, every county in the State will have its Agricultural Society, as an auxilliary in the great work."[8] The following year, 1855, there were eighty-three life members and 8,000 annual members.[9]

The Society aspired to be a scientific body as well as an organization of working farmers. In 1856 it numbered among its officers a "Chemist and Geologist," S. S. Haldeman of Columbia. In 1877 the constitution was revised to provide: "There shall be chosen a botanist, chemist, pomologist, mineralogist, entomologist, veterinary surgeon, and a microscopist, who shall be honorary members of the board, and shall serve without compensation."[10] These technical advisors, some of whom were poorly qualified, made annual reports to the Society. A chemist was employed to whom members could send samples of soils, fertilizers, and other materials for analysis.

After 1855 dissension began to divide the ranks and chill the enthusiasm of members. Much of this centered around the dominating personality of that stormy petrel of Pennsylvania agriculture, James Gowen of Philadelphia, then President. In March, 1856, the *Farm Journal and Progressive Farmer* commented: "The present condition and future prospects of our State Agricultural Society are subjects deserving the closest attention. . . . The expenses of the last exhibition so largely exceeded the receipts, [as to have depleted the treasury]. . . . Mr. Riddle, of Washington County, has made a move in the Legislature . . . to repeal the clause of the Society's act of incorporation appropriating $2,000 annually to it. . . . We are aware that there has not been for some time past that harmony of feeling in its councils which is so essential."[11] The Society weathered this storm; by 1870 it had 819 life members. Thereafter the character of the annual proceedings changed; they no longer were devoted mainly to reports from county societies and to data concerning the State fairs, but included more addresses and discussions.

After 1880 interest in the Society waned, partly because the quarterly meetings of the State Board of Agriculture were more attractive to farmers and partly because of financial difficulties. In his message to the General Assembly on January 6, 1885, Governor Robert E. Pattison questioned the legality of State appropriations to it, a private corporation. Recurring losses at annual exhibitions, especially at Philadelphia from 1884 to 1888, put the treasury about $100,000 in the red. In 1887 the General Assembly refused to appropriate $50,000 to help liquidate this debt.[12]

On March 13, 1895, the Legislature discontinued its annual appropriation to the Society. This vote of lack of confidence, together with mounting evidence of inefficiency in management, brought the Society into such disrepute that it ceased to be an important factor in Pennsylvania agriculture. In 1892 a remnant of the once great membership voted: "That the finance committee . . . be authorized to offer all our creditors ten per cent. in full settlement of their claims."[13] In 1899 the skeleton organization was still hopeful; it reported, "All claims, excepting one small one, has been adjusted, with sufficient money in the treasury, and pledges by friends, to hold an old-fashioned, first-class fair in Lancaster, in September, A. D. 1900."[14] This hope was not realized. For a few years the officers were listed in the annual reports of Pennsylvania Department of Agriculture, but no meetings were held. The Society gave up the ghost in 1905. For nearly a quarter of a century it was the foremost exponent of Pennsylvania agriculture; then it began to disintegrate.

THE GRANGE

After 1870 the Order of Patrons of Husbandry, better known as the Grange, was foremost among agricultural organizations in Pennsylvania. It was founded on December 4, 1867, in Washington, D. C., by a federal employee, Oliver H. Kelly, with the cooperation of William Saunders, who also was employed by the government and had been a gardener at Germantown. It was an expression of the economic distress and social unrest among farmers at that time.

On April 8, 1868, Kelly granted the first dispensation in the nation for a subordinate or local grange to W. T. Hildrif, D. W. Gross, and G. Small of Harrisburg. This local never functioned. The first active subordinate grange in this State was Eagle Grange at Montgomery, Lycoming County; this was chartered March 4, 1871, mainly through the efforts of Luke Eger.[15] By 1873 there were twenty-five granges in Berks, Bucks, Chester, Crawford, Cumberland, Lancaster, Lebanon, Lycoming, Monroe, and Montgomery counties. On September 18, 1873, delegates from twenty-two of these met at Reading to organize the Pennsylvania State Grange. David B. Mauger of Berks County was the first State Master.

During the next few years the order had a phenomenal growth. By 1875 there were over 400 subordinate granges having 18,000 members;

a year later, 626 granges with 28,174 members. The first issue of a weekly paper, *The Farmers' Friend and Grange Advocate*, appeared in October, 1874. What is thought to have been the first Pomona or district grange in the United States was organized on May 11, 1875, to serve Dauphin and Perry counties. By 1880 Pennsylvania was one of the strongest grange states in the Union, in recognition of which the National Grange held its annual meeting at Philadelphia in 1886.

The original objective of this first mass movement of American farmers was educational. In its first printed circular, issued November 1, 1867, the founder stated, "Its purpose is to encourage and advance education in all branches of agriculture." In 1870, William Saunders amplified this statement: "To learn and apply the revelations of science as far as it relates to the farmers' products . . . are the ultimate objects of our organization." At the first delegate session of the National Grange in 1873, however, a much broader declaration of purpose was adopted. "We propose meeting together, talking together, working together, buying together, selling together and in general acting together for our mutual protection and advancement. . . . We must dispense with the surplus of middlemen."[16] This new point of view resulted from the panic of 1873 and the greatly intensified disadvantage of farmers in the period between 1870 and 1880.

The organization then embarked upon a great variety of cooperative enterprises, such as buying and selling, fire and life insurance, banking, the manufacture of farm and home equipment, retail stores. In 1877 the Pennsylvania State Grange solicited the patronage of its members in the purchase of clothing, furniture, and all kinds of farm supplies. By 1880 most of these enterprises, except cooperative buying of supplies and insurance, had failed. This brought the Order into disrepute, especially with those who had joined expecting it to work political and economic miracles. The membership fell off as fast as it had been built up. By 1890 the Grange was at low ebb in this and other states.

The order weathered the storm because it had inherent strength in its all-around program for the betterment of the economic, social, and educational conditions of farmers. A significant source of that strength was the participation, as members, of farm women and of children over fourteen years of age; it represented the farm home as a whole and conserved family life. In 1882 the National Grange stated, "We would especially urge the importance of woman's mission in the Grange. No social, educational or moral endeavor can prosper without her sympathy and support. The founders of the Grange wisely opened the door and bade her welcome." Four Grange offices were occupied exclusively by women, and they were eligible for any office, including that of Master.

The ebb tide of interest in the Grange began to turn about 1890. By 1900 there were 526 subordinate granges in Pennsylvania, with a membership of 20,000. In 1940 Pennsylvania was third among the states in Grange strength, with 757 active granges and 62,679 members. In addition, there were 143 Juvenile Granges (members eight to fourteen years old, whose parents were eligible to membership in the Grange), with 4,000 members, and fifty-eight Pomona Granges. In general, the northern counties were strongest in Grange membership, the southeastern counties weakest, largely because most Pennsylvania German farmers look with disfavor on secret societies of any kind. The annual meetings of the State Grange brought together many hundreds of delegates and were fairly representative of Pennsylvania agriculture. The monthly *Pennsylvania Grange News,* established in 1903, went into 43,000 farm homes.

Among auxiliary organizations operated by the Grange were the Keystone Grange Exchange, a cooperative purchasing agency; twenty-four Grange Mutual Fire Insurance Companies, with risks aggregating $110,000,000; an automobile liability insurance company; and the Farmers' and Traders' Life Insurance Company. At its annual meetings in 1905 and 1906 the State Grange authorized the formation of Grange National Banks; and several were established.

For three-quarters of a century, the Grange has been a powerful voice for the betterment of the economic, social, and educational conditions of rural Pennsylvania. It has pressed for the improvement of rural schools and highways, the equalization of school and highway funds, rural free delivery and parcels' post, reduction of the tax levy on real estate, the conservation of natural resources, and other commendable objectives, many of which have been realized. It has constantly advocated home rule and freedom of rural people from domination by the state or federal government. It championed woman suffrage, and has been a staunch supporter of agricultural education. At the annual meeting of the State Grange in 1922 it was voted to raise funds to build a dormitory for girls at The Pennsylvania State College. This was an appropriate objective in view of the recognition given to women in the Order. About $100,000 was contributed by practically all the subordinate granges in the State.[17] The "Grange Dormitory" was dedicated on August 14, 1929.

The Grange is a potent social factor in rural communities. At the monthly or semi-monthly meetings farmers, their wives, and older children find opportunity for diversion—drama, singing, dancing, picnic suppers, athletic contests—as well as for the discussion of timely farm problems. The literary program may include talks and discussions on agricultural topics and a review of current events and reading matter. The meetings are held in schoolhouses, village halls, and sometimes in homes; but most granges have built Grange Halls. In 1926 more than 400 subordinate granges owned the buildings in which they met; these were valued at $2,000,000. Some farmers are impatient with the elaborate secret ritual of the Grange, but most of them find it beautifully symbolic of the major objectives of the Order.

OTHER STATE-WIDE ORGANIZATIONS

From 1880 until 1895, when interest in the Grange was at low ebb, many farmers joined the Farmers' Alliance and Industrial Union. For a brief period, chapters sprang up like mushrooms all over the State. This organization was an expression of the widespread discontent among farmers at that time. The flamboyant constitution of the organization defined its objectives to be "to encourage the toiling masses . . . to combat the over-powering monopolies that tend to enslave a free people . . . and to dry the tears of widows and orphans." In 1899 there were sixteen county and 105 local groups.[18] By 1920 most of these had disbanded; the organization was too radical to make a permanent appeal to Pennsylvania farmers. The State Alliance existed until 1925 and operated a mutual fire insurance company and a cooperative store.

The National Farmers' Union made some headway in Pennsylvania during the depression years of 1929-1936, but its socialistic views found few sympathizers in this State and it failed to gain a permanent foothold. The National Agricultural Congress, which was organized at Atlanta in 1870, met at Philadelphia in 1876. It was a sounding board for discontented farmers of the South and West, but attracted few from conservative Pennsylvania.

In 1897 there were but two State-wide educational organizations of farmers, the State Agricultural Society and the State Horticultural Association; by that time the State Dairymen's Association had become practically a local organization serving Crawford and adjacent counties only. After 1898 the number of State-wide organizations increased rapidly. By 1940 there were seventeen, together with numerous livestock breed associations.

The Pennsylvania Horticultural Society was organized November 24, 1827; its first exhibition of fruit, and the first in America, was on November 3, 1828. By 1836 it had a national reputation, especially for exhibitions featuring new ornamental plants and new varieties of fruits and vegetables. In 1836 it introduced the sugar beet into the United States. The poinsettia was one of many ornamentals brought to the United States by this Society. In 1844 it had 800 members. Its first Horticultural Hall was completed in 1867 and destroyed by fire in 1881. The second Horticultural Hall was completed in 1882 and destroyed by fire in 1893. The third Horticultural Hall was completed in 1896 and sold in 1917.

Between 1887 and 1920 the Society was at low ebb, largely because it was controlled by commercial interests; in 1915 there were only 150 members. In 1921 it was revived on a strictly amateur basis, as it had been in the beginning. By 1927 it had 1,344 members, and its flower shows attracted national interest. After 1921 the Society was concerned almost exclusively with ornamentals and attempted to serve the Philadelphia district only; it was no longer a State-wide society. Its horticultural library is one of the best in the nation, especially in historical material.

The State Horticultural Association was born at Lancaster on September 1, 1859, as The Eastern Pennsylvania Fruit-Growers' Society.[19] In 1865 the name was changed to Pennsylvania Fruit Growers' Society, and in 1881 to State Horticultural Association of Pennsylvania. Vegetable growers first met separately as a Vegetable Growers' Section of the Association in 1913. In 1929 this group withdrew and formed the State Vegetable Growers' Association.

The State Dairymen's Association was organized at Venango, Crawford County, on April 15, 1871, as the Crawford County Dairymen's Association.[20] The name was changed to Pennsylvania State Diarymen's Association on June 2, 1875.[21] In 1883 it held its annual meeting in eastern Pennsylvania for the first time, at West Chester, and again in 1884 at Doylestown; previously it had met only in northwestern counties, usually at Meadville. After 1887 interest in this organization declined since its meetings were devoted mainly to discussion of problems in cheese manufacture and did not attract the butter and market milk dairymen of the eastern counties. On March 30, 1898, the Pennsylvania Dairy Union came into being.[22] Its first meeting was at Williamsport, in December of that year. By 1905 its membership represented all sections of the State including the area formerly served by the now defunct State Dairymen's Association. In 1916 the Dairy Union and the Livestock Breeders' Association, which had been organized in 1897, merged to form the Pennsylvania Livestock Breeders' and Dairymen's Association.[23] In 1925 the dairymen withdrew from this body to form the present State Dairymen's Association.

The first State Poultry Society was organized in Philadelphia on September 24, 1852.[24] Its members were mostly poultry fanciers; practically its sole activity was to promote State and local shows of fancy breeds. The first exhibition was at Philadelphia on November 24-26, 1852. It held shows until 1895. The present State Poultry Federation was organized in 1912; for some years previous it had been the Pennsylvania Branch of the American Poultry Association.

The State Potato Growers' Association was organized December 6, 1917.[25] In 1936 the name was changed to Pennsylvania Cooperative Potato Growers' Association, and it embarked upon a program of cooperative marketing as well as education. Its quarterly publication, *The Guide Post,* went to all of its 2,000 members. The Association owned and operated "Camp Potato," a 270-acre tract in Potter County, equipped with buildings, which was dedicated August 17, 1938. This was used for meetings of the Association, outings of potato growers, and experiments in potato breeding.

The Pennsylvania Forestry Association, a quasi-agricultural group, was organized in July, 1886. It was largely responsible for the establishment of the Department of Forests and Waters. Its publication, *Forest Leaves,* has been one of the most influential magazines in this field.

Among other State-wide organizations active in 1940 were:

Society of Farm Women of Pennsylvania, organized in 1910. In 1940 there were thirty-one local chapters of this organization, mainly in Lancaster, York, Cambria, and Somerset counties.

State Nurserymen's Association, organized January 21, 1904.[26]
State Bee-keepers' Association, organized in 1904.[27]
Sheep Breeders' and Wool Growers' Association.
State Tobacco Growers' Association.
State Nut Growers' Association.
State Horse and Mule Breeders.

In addition, there were twelve livestock breed associations. A few organizations, as the Plant Breeders' Association of 1913, the Rural Progress Association of 1911, and the State Conservation Association of 1914, have fallen by the wayside. The first conference of the Pennsylvania Country Life Association was held at Newton Hamilton, Mifflin County, in 1936.

The issue of whether State-wide agricultural organizations are entitled to financial support from the State was not settled until 1914. When the State Agricultural Society was chartered, in 1851, the General Assembly granted it an annual appropriation of $2,000. This was withdrawn in 1895. Under provision of the Act of May 24, 1879, the State Horticultural Association and the State Dairymen's Association received an annual appropriation of $350 each, plus the printing of their proceedings. This aid was discontinued in 1895 when the Attorney General ruled that the Act of March 13, 1895, withdrawing State appropriations to the State Agricultural Society, upon constitutional grounds, applied to other agricultural organizations as well.[28]

When the Pennsylvania Department of Agriculture was organized, in 1895, it discontinued printing the proceedings of State organizations in its annual report. In 1899, however, this practice was resumed. In 1909 the General Assembly appropriated $1,000 each for two years to the Horticultural Association, Dairy Union, and Livestock Breeders. In 1911 this was increased to $2,000 each; a similar sum was made available in 1913, with the addition of the Poultry and Bee-keepers' Associations to the list of beneficiaries. After 1914 State appropriations ceased.

STATE COUNCIL OF FARM ORGANIZATIONS

Several attempts have been made to federate State-wide organizations so that they could speak effectively for agriculture, especially in legislative matters. The first such attempt was made by the State Agricultural Society. On January 18, 1888, it resolved: "For the purpose of harmonizing and furthering the cause of agriculture in all its various departments, it is proposed that the Pennsylvania State Agricultural Society, the Fruit Growers', Dairymen's Association, and all kindred organizations . . . conduct a State Convention under the auspices of the Pennsylvania State Board of Agriculture."[29] The Pennsylvania State Association of Agricultural Societies, which was organized in 1889 as a result of this action, met an early demise.

Subsequently a number of organizations held joint meetings. In 1906 the Dairy Union and Livestock Breeders met together in Pittsburgh, and in 1907 these two groups and the State Board of Agriculture had some joint sessions in Harrisburg. In 1913 the State Horticultural Association joined them. In 1915 several other groups had simultaneous meetings and held joint evening sessions. Out of these joint meetings, and the exhibits that accompanied them, came the Farm Show.

The next affiliated group was the Allied Agricultural Organizations of Pennsylvania. This developed at a meeting of State-wide organizations held at The Pennsylvania State College on June 4-5, 1900. On January 21, 1902, thirty-two delegates representing sixteen organizations and public agencies took joint action on certain legislative matters, particularly the erection of an agricultural building and the establishment of a Department of Forestry at the College.[30] The State Grange, State Board of Agriculture, Dairy Union, Horticultural Association, Poultry Association, and other groups joined in this action. The Allied Agricultural Organizations of Pennsylvania was not active, as such, after 1905.

At a meeting of the State Board of Agriculture on May 22, 1912, a motion was passed to appoint a committee to meet with similar committees from all State-wide organizations "for the purpose of federating these organizations and thereby securing their cooperation on all matters relating to the advancement of agriculture in this state." This resulted in the organization of the Agricultural Federation of Pennsylvania on October 1, 1912, by delegates from the State Grange, Dairy Union, Livestock Breeders' Association, Horticultural Association, Poultry Society, Bee-keepers' Association, and Rural Progress Association, together with representatives of the Pennsylvania Department of Agriculture, the State Board of Agriculture, and The Pennsylvania State College.[31] In 1913 the name was changed to

Pennsylvania Federation of Agricultural Associations. The group did not function after 1916.

On the initiative of Governor Gifford Pinchot and Secretary of Agriculture Frank P. Willits, an agricultural conference was held at Harrisburg on February 20-21, 1923. It divided into sections representing different commodity interests, each of which made recommendations for the betterment of conditions in its field. It was recommended that the conference be held annually and be known as the State Federation of Agricultural Organizations, having as its object "to safeguard and promote the agricultural interests of the state. . . ." Its membership was to "be composed of representatives from any actual active farmers' organization of Pennsylvania."[32] The name finally adopted was State Council of Agricultural Organizations; later this was changed to State Council of Farm Organizations.

The purposes of the Council as stated in the constitution were:

1. To bring together representatives of State agricultural organizations and agencies at a roundtable for mutual understanding and discussion of their problems.
2. To coordinate agricultural policies for definite action.
3. To support measures beneficial to agriculture.

One of the first activities of the Council, through its Joint Committee on Rural Electrification, was to promote the more general use of electricity on farms. It sponsored an enlarged State appropriation for the control of bovine tuberculosis and Bang's disease of cattle. It secured more adequate appropriations to the Pennsylvania Agricultural Experiment Station. It favored State programs over federal programs for the improvement of agriculture. By 1940 the Council was a powerful voice of Pennsylvania agriculture.

Pennsylvania farmers have been represented in the national field by several organizations. In 1841-1842 the Agricultural Society of the United States, to which this State sent several delegates, held a national convention at Washington. It was hoped that a fund bequeathed by Hugh Smithson could be used to further the objectives of the Society, but it was used instead to found the Smithsonian Institution, whereupon the Society disbanded. In 1852 a convention of 152 delegates from twenty-three states and territories organized the United State Agricultural Society. This met annually for ten years and held several national exhibitions, one of which was at Philadelphia in 1856 in cooperation with the Philadelphia Society for Promoting Agriculture. After the Civil War the United States Department of Agriculture assumed many of its functions, and the Society withered away.

The National Grange, founded in 1867, has been the most influential representative of Pennsylvania farmers at the national capital; the

Farmers' Union, founded in 1902, has spoken mainly for the South; and the Farm Bureau Federation, founded in 1919, mainly for the West. Each of these organizations has maintained headquarters in Washington to study proposed farm legislation and to support or oppose it. The three national organizations have not always agreed on policies; often there has been divided council, to the great disadvantage of agriculture. The National Association of Farmer Cooperatives and the National Milk Producers' Federation, also, have wielded a powerful influence on federal legislation.

At the beginning of direct American participation in World War I, in September, 1917, the National Board of Farm Organizations was established. It was hoped that this would bring together organizations that heretofore had operated independently and that it would become the sole spokesman for American farmers in national affairs. The Pennsylvania State Grange strongly supported this organization. In 1919 it was proposed that a Temple of Agriculture be erected at Washington at a cost of $8,500,000. Subscriptions were solicited from farm organizations in each state; the allotment to the Pennsylvania State Grange was $46,000, of which the sum of $30,000 was raised. The project was abandoned about 1925 because of lack of support from other states and other organizations; thereafter the National Board of Farm Organizations ceased to function.

COUNTY AGRICULTURAL SOCIETIES

State aid for the Berkshire type of county agricultural societies was withdrawn in 1825, after which most of them disbanded; only in a few of the older counties, as Bucks and Chester, did they persist. In 1848 the Delaware County Institute of Science reported, "No agricultural societies or farmers' clubs exist in the county"; but this organization, established in 1833, served somewhat the same function.[33]

The signal for the rebirth of county agricultural societies was the Act of March 29, 1851, incorporating the State Agricultural Society. This provided, "When any number of individuals shall organize themselves into a county agricultural or horticultural society . . . said society shall be entitled to receive from the treasury of said county a sum equal to the amount paid annually by the members in dues; *Provided* that said annual payment of the County funds shall not exceed one hundred dollars. . . . The Presidents of the several county agricultural societies shall annually transmit a report to the State Agricultural Society."[34] In 1855 it was reported, "There is one in almost every county in the State."[35] Some had a membership above 500; in 1853 the Chester County Agricultural Society had 700 members, and the Franklin County society 739 members. Some were financed by selling stock at one to ten dollars a share; others were financed on the mutual plan.

Few county societies made annual reports to the State Agricultural Society as required by law. Some held monthly meetings to discuss agricultural subjects, but most of them confined their activities to the holding of an annual exhibition. In 1853 John Strohm of Lancaster County reported, "Our farmers manifest very little interest in the transactions of the Agricultural Society, and are so negligent in attending our meetings, that were it not for a few lawyers in the city, and some members from the county, who may happen to be in town on those days, we should hardly be able to raise a quorum . . . of nine members."[36] In addition to awarding premiums for products exhibited at the annual fair, some societies awarded premiums for "the best field of wheat" and similar awards for timothy, corn, and oats; also "for the best cultivated farm." A committee visited the farms entered in the competition and made a report to the society detailing the methods followed on each farm.[37]

Sweetness and light did not always prevail at meetings of county agricultural societies. Witness this (Democratic) account of a meeting of the Columbia County Agricultural Society in June, 1862: "It consisted of about two dozen persons, all of whom were most intense Republicans, with but two exceptions. These were Democrats, and occupied a back seat, looking . . . lonely and disconsolate . . . one Republican nominating another, and the other Republican electing him. . . . The Republicans filled the board with persons of their own political faith, and the whole concern is now in their hands."[38]

In 1860 the Chester County Agricultural Society opened its library and reading room to members.[39] The library numbered several hundred volumes and contained all the prominent agricultural periodicals of the time. The Montgomery County Agricultural Society also had a large library.

During the Civil War most county societies were quiescent; some were not revived after the war. In 1879 there were eighty-one county and local societies in fifty-two counties, thirty-three of which were represented on the State Board of Agriculture.[40] In 1880 only ten of the eighty-four societies held educational meetings.[41] During the difficult times that followed, the educational objective of most county societies was ignored. Said Secretary of Agriculture Thomas J. Edge in 1896, "Many . . . through indifference . . . and local mismanagement, have dwindled down until they are now merely societies for the encouragement of speed in horses, and have lost nearly all of their original character and purposes and cease to represent the agricultural interests of the State."[42]

After 1890 the organization of a large number of granges provided a more satisfactory forum for farmers, and county societies began to wane. With the advent of more prosperous times, about 1900, and the development of greater specialization in agriculture, many new county agricultural and horticultural societies were organized on a strictly educational basis, without exhibitions, especially those serving fruit growers and potato growers. A new feature of their program was the annual automobile trip to inspect the farms of their competitors in other counties or other states. In 1940 nearly every county had five or more county agricultural organizations aside from those that existed primarily to hold fairs. The diversity of these organizations is indicated by the list for Lancaster County:[43]

Pomona Grange
Agricultural Extension Association
Farm Loan Association
Bee-keepers' Association
Fruit Growers' Association
Florists' Association
Carnation Growers' Association
Tobacco Growers' Association
Poultry Association
Farmers' Union
Ayrshire Breeders' Association
Holstein Breeders' Association
Guernsey Breeders' Association
Council of Cooperatives
Society of Farm Women
Farmers' Guild

Several county horticultural societies were in existence before 1859, when the State Horticultural Association was born. One of the strongest was that of Chester County; it held largely attended meetings and exhibitions before 1845. In 1850 it built a capacious exhibition hall, and for several years thereafter held "two semi-annual exhibitions attended by some thousands of people."[44] The Pittsburgh Horticultural Society was organized in 1854, the Berks County society before 1870, and the Bucks, Lancaster, York, and Lycoming societies before 1875. From 1910 to 1918, the annual meetings of the Adams County Fruit Growers' Association, organized in 1904, rivaled those of the State Horticultural Association.

Between 1850 and 1890 neighborhood Farmers' Clubs were a potent force for agricultural progress; after 1890 their functions were largely taken over by the Grange. The pattern for these organizations was the Farmers' Club of the Philadelphia Society for Promoting Agriculture, established in 1847. Their objectives and methods were set forth in 1856: "A few congenial farmers met together and selected one of their number Secretary. . . . We met at each others' houses in turn the first seventh day in each month. . . . The system of culture; the fences, stock, farming implements, garden, buildings, and indeed every department of the farm, are examined and criticized to the fullest extent . . . each member is required to give his opinion. . . . No rules have been found necessary for our government save those of kindness to each other and deference to conflicting opinions. We have been thus associated more than twelve years, with the interest unabated."[45] The women met in another room of the farm home to discuss homemaking. Membership was limited to twelve to fifteen families. Usually there were no officers and no dues. Sometimes an Executive Committee assigned questions to members for discussion.

Farmers' Clubs were most numerous in the older counties, particularly in Chester and Bucks counties, but there was at least one in nearly every county; in 1870 there were seven in Butler County. The Solebury Farmers' Club of Bucks County, organized in 1871, had a national reputation. Other outstanding Farmers' Clubs were the Experiment Farm Club at West Grove, Chester County, organized in 1874, which held its meetings at the Eastern Experimental Farm; the Chadd's Ford Agricultural Association of Chester County, organized in 1875; the clubs at Horsham and Wrightstown, Bucks County; the Octoraro and Fulton clubs in Lancaster County; the Penn-Mar club of southern York County; and the McCormick Estate Farmers' Club of Cumberland County. In 1884 there were over 100 Farmers' Clubs in the State as well as 650 Granges, which had displaced many Farmers' Clubs.[46] In 1940 there were only twenty, all of which were in southeastern Pennsylvania, six being in Chester County.

A few inter-county or district organizations have had their brief day in the sun. One of the most notable of these was the Farmers' Institute of Eastern Pennsylvania, organized in 1871.[47] Sixteen county agricultural societies and Farmers' Clubs of the southeastern counties were represented at the second meeting, held at Lancaster, March 9, 1871. In addition to an educational program of essays and discussions, the Institute sought to promote cooperation and to guide legislation. It soon fell by the wayside.

STATE FAIRS

The agricultural fair is an important rural institution. Its origin may be traced to medieval Europe and even to more primitive times. For centuries the primary objectives were commerce and trade. Since 1800 the objectives have been commerce, education, and recreation; the relative emphasis placed on each has varied with the time and place. Early agricultural fairs in Pennsylvania were primarily educational in purpose. In recent years the commercial and social objectives have been more prominent in most fairs. The "golden age" of the agricultural fair was from 1850 to 1870; during this period it was the most common associated effort of farmers, and the chief agency for the dissemination of new ideas on farming, better types of livestock and crops, and improved farm machinery.

The first *bona fide* State fair was that held in 1851 at Harrisburg by the State Agricultural Society, but a number of exhibitions had been held previously that had attracted more than local interest. Among these were two exhibitions by the first Pennsylvania Agricultural Society, in 1823 at Paoli, and in 1824 at Chester. The society perished soon after. The exhibitions of the Philadelphia Society for Promoting

Agriculture, especially those held between 1840 and 1850, attracted State-wide interest. In 1839 the General Assembly revived the Act of March, 1821, which granted to the Society $50 annually for each member of the House from the city and county of Philadelphia, this to be used for premiums at exhibitions.[48] The Society also awarded premiums to the winners of plowing matches and "for the best field of wheat, not less than three acres." Similar awards were made for the best fields of corn, oats, rye, barley, potatoes, sugar beets, carrots, parsnips, and turnips.

At all early exhibitions, county and State, the plowing match was the lodestone that drew farmers. *Farmers' Cabinet* thus reports the exhibition of 1841: "The immense concourse of persons who assembled together on the second day of the Exhibition of the Philadelphia Agricultural Society, to witness the trial of Ploughs, showed very clearly the intense interest with which the subject was viewed by all classes; indeed, there is no object which at the present time is at all comparable with it in novelty, usefulness, or general importance."[49] The exhibition of the Society at Rising Sun, October 8-9, 1851, was particularly outstanding.

After the State Agricultural Society was organized, in 1851, the Philadelphia Society for Promoting Agriculture continued to hold fairs that compared favorably with those of the new organization. There was intense rivalry between the two groups. In 1853 fifteen members of the Philadelphia society contributed $1,000 each to purchase permanent exhibition grounds at Mount Airy, near Philadelphia, but the tract never was used for this purpose. The last large exhibition was in 1855, on the banks of the Schuylkill. In October, 1856, it cooperated with the United States Agricultural Society which held its second annual exhibition on the same site. Thereafter the State Agricultural Society was in undisputed control of State fairs.

The first State fair under the auspices of the State Agricultural Society was at Harrisburg on October 29-31, 1851.[50] During the next half century forty-six fairs were held, nine at Philadelphia, three each at Harrisburg, Pittsburgh, and Lancaster, and one or more at Norristown, Williamsport, Easton, Scranton, Erie, York, Bethlehem, Indiana, Uniontown, Johnstown, and other points. No fairs were held in 1883 and 1894. In 1892 there were two fairs, at Scranton on September 5-10, and at Lancaster on October 10-15.

Most of the exhibitions were held in cooperation with the fairs of county agricultural societies. At some points the Society erected buildings which were left for the use of the county society; its contributions in this respect were said to exceed $200,000. It contributed $1,000 toward the Centennial Exposition in 1876. In 1880 its fair at Philadelphia was in cooperation with the International Sheep and

Wool Exhibition, to which the Society contributed $12,500. The fair at Norristown scheduled for October 1-3, 1862, was postponed two weeks "On account of the threatened invasion of the State by the Southern army."[51]

The first State fair at Harrisburg was a great success. The grounds were beautifully located on the eastern bank of the Susquehanna about one mile north of Harrisburg. The attendance was variously estimated at 35,000 to 45,000. The citizens of Harrisburg were so enthusiastic about it that they offered to raise funds to purchase thirty acres of land, erect suitable buildings thereon, and donate the property to the Society if it would agree to hold the State fair there annually. The Society decided, however, to hold fairs in a different part of the State each year.

The second State fair, at Lancaster in 1852, was an even more glittering success; attendance was said to be "probably unprecedented in the history of state agricultural societies." The third fair, at Pittsburgh in 1853, was witnessed by 90,000 to 100,000 people." The proceeds of that fair amounted to $16,000, exceeding by $2,000 the receipts of any ever held in the United States."[52] The fourth fair, at Philadelphia, was thus described by the *Cultivator:* "The Pennsylvania State Fair, which was held at Powelton, near Philadelphia, last week, was one of the most successful in every respect, that has ever been in this country. Though none but members, or those who paid $1, were admitted the first two days, yet the attendance was very large, but on Thursday, when the charge was reduced to 25 cts., nearly Fifty Thousand Single and Family tickets, were sold, and it was estimated that at least 100,000 persons visited the grounds during the day."[53]

This was an auspicious beginning. The Society continued to hold exhibitions annually throughout the State with varying degrees of success, until 1884, when it decided to develop a permanent location at Philadelphia. This proved to be a costly mistake. A thirty-acre tract was leased for ten years and buildings erected on it at a cost of $80,000. The 1885 fair, which extended from September 23 to October 14, was conducted at a loss of $8,000. In 1886 the President admitted, "We are compelled to report that your Society is at present financially embarrased."[54] By 1888 it was in the red $100,000. Foreclosure on the Philadelphia exhibition grounds and bankruptcy followed. The General Assembly declined to come to its aid. For a few years the now thoroughly discredited State fair was peddled around to the highest bidder among county agricultural societies, but it had ceased to be an important factor in Pennsylvania agriculture. The last exhibition was at Johnstown, in 1897.[55]

After the unlamented demise of the fair of the State Agricultural Society, persistent efforts were made to secure a State fair worthy of the name. E. S. Bayard, editor of *National Stockman and Farmer,* led this movement.[56] In 1899 he called the first meeting for this purpose. Out of it came the organization of the State Livestock Breeders' Association, which immediately began to agitate for a State fair. Soon it was joined by the Dairy Union and the State Horticultural Association. In 1905 these organizations introduced in the General Assembly a bill to appropriate $150,000 to purchase a site, erect buildings, and provide $50,000 for premiums for two years.[57] The bill failed to pass in 1905 and also in 1907, 1909, 1911, and 1913, largely because of opposition from the Pennsylvania Fair Association, which thought that a State fair might jeopardize State appropriations to county fairs. A bill to authorize the appointment of a State Fair Commission passed both houses in 1909, but was vetoed by Governor Edwin S. Stewart for financial reasons.

In his message to the Legislature in January, 1913, Governor John K. Tener recommended an appropriation of $500,000 to establish a State fair, but no action was taken. On the recommendation of Governor William C. Sproul, the General Assembly of 1921 passed an Act creating a State Fair Commission with an appropriation of $15,000 to inspect proposed sites and recommend a plan of operation to the next legislature. The Commission discharged its function, but no action was taken by the General Assembly of 1923. In 1925 the State Chamber of Commerce developed a plan for a privately-financed State fair. By this time, however, the midwinter State Farm Products Show had so convincingly demonstrated its usefulness as a practicable substitute for a State fair that agitation for the fair ceased.

A few other fairs have been of more than local significance. For about twenty-five years the Bucks County Agricultural and Mechanical Institute, which was incorporated September 16, 1857, but which had existed as the Bucks County Agricultural Society since 1844, held fairs that attracted exhibitors and attendance from far beyond the county. The Grange Fair and Encampment at Centre Hall, Centre County, has been a major attraction for farmers throughout central Pennsylvania every year since it was founded in 1873 by Leonard Rhone. The agricultural exhibits of the Centennial Exposition at Philadelphia, May 10 to November 10, 1876, were outstanding, especially of farm machinery. About 1896 the Grangers' Inter-State Exposition and the Mount Gretna Agricultural, Mechanical and Industrial Exposition were ambitious projects. From 1900 to 1915, the annual grange picnic and exhibition at Williams' Grove, on a beautiful island in Yellow Breeches Creek, Cumberland County, attracted many thousands.

The Fat Stock Show at Pittsburgh was one of the best in the country; carlot exhibits came to it from midwestern states as well as from Pennsylvania. After 1900 it was superseded by the International Livestock Exposition at Chicago—the "Supreme Court of Beef Cattle"—and by the Lancaster Fat Cattle Show. Exhibits in the Palace of Agriculture of the Sesqui-Centennial Exposition held at Philadelphia in the summer of 1926 were disappointing as a whole, but the show of livestock was the largest ever seen in Pennsylvania—over 3,000 head. The Potato Exposition held at State College August 19-22, 1929, was said to have been "the greatest exhibition and demonstration of potato machinery in America." Certain county fairs, especially those at Lancaster, York, Allentown, and Reading, have attracted attendance and exhibits from many counties.

COUNTY AND COMMUNITY FAIRS

After State support was withdrawn from the Berkshire type of county agricultural societies, in 1825, the number of these societies and fairs dwindled. They had a rebirth in 1851 with State support under the charter of the State Agricultural Society. In 1854 there were twenty-three county fairs. Of these, the Bucks, Berks, Chester, Lancaster, and York fairs were strongest. By 1857 there were seventy-one county and community organizations holding exhibitions.[58] In 1892 there were eighty-one, of which fifty were organized on the stock plan and thirty-one on the mutual plan. The aggregate attendance that year was 415,500.[59]

Besides offering premiums for superior farm products on exhibition at the fair, many organizations had Visiting Committees, which reported in detail methods followed by the most outstanding farmers of the county and awarded premiums "for the best farm." This may be considered a forerunner of the present Master Farmer award. Sometimes corn husking matches were held at the exhibitions. Each contestant was given a shock of corn having exactly the same number of ears as the shocks of other contestants. The man who could shuck all the ears clean and tie up the fodder in the shortest time was the winner. At a content held at the Chester County fair in 1858, Abraham Jackson husked 108 ears in eight minutes.[60]

Under successive Acts, the General Assembly has appropriated funds for the partial support of county fairs. In 1907 the sum was $500 to each fair; the Pennsylvania Department of Agriculture was responsible for administering the Act. The money could be used only for paying premiums. Subsequently these grants were equal in amount to one-half the sum paid as premiums on farm exhibits up to $1,000 for each fair, with a maximum of $2,000 to a county when more than one fair was held. In 1921 the county associations paid $224,000 as premiums and were reimbursed $55,000 by the State. In order to qualify for state aid, the fair association must be incorporated and hold exhibitions of not less than three days' duration.

After 1910, neighborhood or community fairs were more numerous. The general character of these exhibitions was set forth by *Pennsylvania Farmer* in 1931: "The community farm show has become an established institution in hundreds of rural sections of this state. Farm folks, both young and old, have taken hold of it, adapted it to their interests and needs. . . . Take those in Crawford County, for example. Ten of these shows were held in that county during the fall months of 1930. At these ten were exhibited 7,803 products from the farms and 3,599 products from the farm homes of the county. In connection with them were conducted horse pulling contests, livestock judging contests, demonstrations by boys and girls, parades and athletic events. Evening meetings featuring educational and entertainment programs were a part of the show activities. The total attendance at these ten events was 17,000 and included a large portion of the rural people of Crawford County. In this attendance were included the children in 58 of the rural schools of the county as well as members of the Four-H clubs. These coming farmers . . . constituted a goodly portion of the 'life' of the shows."[61] Community fairs were a reversion to the Berkshire type of fair of 1815, which most county fairs no longer exemplified.

One of the most outstanding community county fairs was the annual Farmers' Day at Ephrata, Lancaster County. More than 50,000 people from southeastern counties attended this show. Said one observer in 1929, "For three days all the show windows on main street were emptied of their regular wares and filled with products from the farm and the farm home. . . . Nine loads of feeder cattle were shown in the nearby stockyards. . . . Four squares on the main street of the town were roped off to accommodate the commercial exhibits of household appliances, heating plants, radios, automobiles, etc. . . . A parade each evening headed by local bands and orchestras added to the entertainment of the party. Above all the fine community spirit . . . among the thousands in attendance each day was most outstanding."[62]

CHANGES IN THE CHARACTER OF FAIRS

The old-time fair, State or county, was a major event in rural life, long anticipated and long remembered. Says a veteran attendant, "The calendar was then built around fair week. . . . For thirty days before the great event, work was planned to have the wheat sowed, the corn shocked, the Sunday vehicles washed . . . the harness blacked and nothing left in the way of an early-morning . . . start to the fair to get the buggy or surrey or spring wagon located in the 'first row' so the women folks when tired out could sit and watch the endless crowd that milled around. . . . More than one farm wagon, bedded with timothy or fresh straw and carrying a cargo of wide-eyed family and home-grown food, rolled out of the barnyard soon after midnight and rumbled into the fair ground at break of day. . . . 'Three-minute' horses did their stuff going to the fair—and returning home, reined high, with rows of red, white and blue rings in their overchecks. . . . Noontime! The baskets, washtubs and cheese boxes of fried chicken, pickles, and cake! . . . The men stood eating with one foot on a hub—they could hold more standing."[63] The fair was a huge picnic; everybody in the countryside went to enjoy a day of visiting, sight-seeing, and recreation.

The dirt roads leading to fair grounds were crowded with wagons, carriages, and busses. Many travelled on foot. Long trains brought visitors from distant places. Schools were closed. Hotel and rooming accommodations were wholly inadequate; many lived in temporary camps. Over all—people, exhibits and concessions—hung a suffocating cloud of dust. The incessant lowing of cattle and crowing of roosters were a bucolic accompaniment to the tin-pan drone of the merry-go-round. The fair was a colorful pandemonium which captivated rural people, especially children.

In early fairs competitive exhibits and contests were an absorbing interest. Men, women, and children began to prepare for them months in advance by raising or making something for the show. The men entered their best working oxen, dairy cows, draft horses, sheep, swine, and poultry, and their choicest field crops. The women entered their best butter, pies, cakes, jellies, their most colorful flowers, most decorative crazy quilts, and other household handiwork. Harassed judges sought in vain to placate disappointed exhibitors who could not understand why they had not been awarded the coveted blue ribbons. Machinery Hall was thronged with cautious purchasers. In the stock-judging ring a bovine drama was enacted when the grand champion of the last show was compelled to yield this honor to a more worthy rival.

All the early State affairs and some county fairs awarded premiums for "the best five acres of corn," the "best acre of wheat yielding not less than forty bushels," and similar premiums for other crops. Competitors were required to file a sworn statement by a land surveyor and by witnesses of the harvest, together with a description of cultural methods practiced. Competitive exhibits were not limited to farm products. At State fairs before 1860, premiums were awarded to a great variety of non-agricultural merchandise, even to "the best metallic burying case," "the best ladies black riding hat," and to stuffed birds. In 1858 an award was made to "a shower bath using only a bucket of water to keep it going twenty-four hours; suitable for bedroom use."

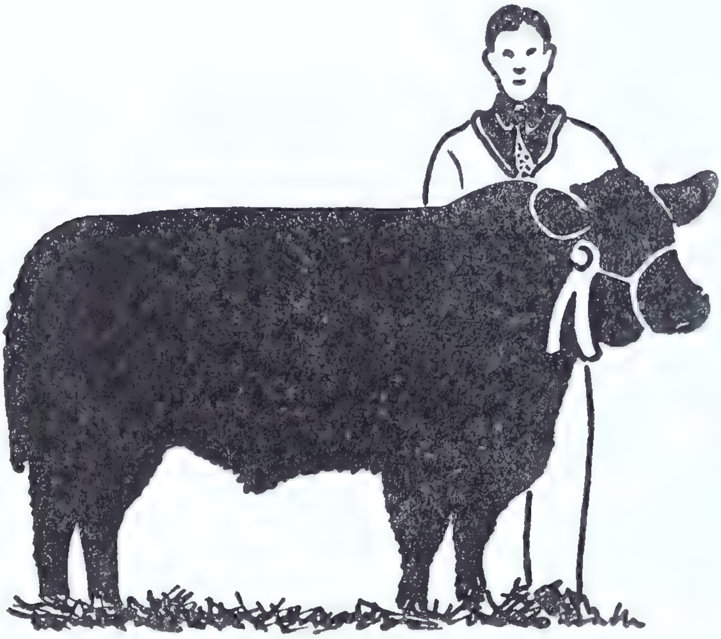
Until about 1850, the foremost attraction at fairs was the plowing match. It was the great sporting event of the year. Victory brought much prestige to the winner. The purpose was not only to discover the most efficient plow, but also the most efficient plowman. The award was made on the basis of well-turned furrows as well as speed. *Farmers' Cabinet* thus describes this event at the fair of the Bucks County Agricultural Society in 1846: "As the time for the plowing match approached, it was astonishing to witness the streams of persons wending their way to the field of trial; showing most conclusively, that this part of our exhibitions is still the most attractive."[64] An unpopular decision by the judges brought roars of disapproval from spectators.

Interest in the annual "agricultural address" almost rivaled that in the plowing match. This was delivered, not by an outstanding farmer, but by a prominent politician. Almost invariably it was more oratorical than agricultural; it bounded with flowery rhetoric and fulsome flattery of farmers. The Honorable Andrew Stevenson of Virginia delivered the address at the first State fair at Harrisburg in 1851. These addresses, commented James Gowen of Philadelphia in 1854, "might have begun with Adam and Eve, in or out of the Garden of Eden, taken up Noah with his broad, alluvial fields . . . thence to the Patriarchs, the [breeding] experiments of young Jacob upon the flocks and herds of his . . . father-in-law, Laban." Thus, in a framework of antiquity, universality, and patriotism, the speaker managed "to place agriculture in the zenith, and the orator in the ascendant, too."[65] In marked contrast were the opening words of Abraham Lincoln in his address before the Wisconsin State Agricultural Society, on September 30, 1859: "I presume I am not expected to employ the time assigned me in the mere flattery of the farmers as a class. My opinion of them is that, in proportion to numbers, they are neither better nor worse than other people."

After 1850, horse racing supplanted plowing matches as the center of attraction at fairs. Speaking of the State fair held at Philadelphia in 1856, the Philadelphia *Ledger* said, "There is danger that agricultural fairs may be ruined by transforming them into race courses. Go to any fair, as the recent state fair near Philadelphia, and you will see tens of thousands of people breathlessly watching the struggle between competing horses while only a few hundreds are to be seen in other parts of the grounds. We submit that the prominence given horse racing is at variance with the true purpose of such fairs, which is to foster a love of agriculture." By that time the era of plow-making by local craftsmen and plowing matches had come to an end.

People were captivated by the speed and excitement of horse racing. The clang of the bell in the starter's tower, the clatter of hoofs, and the excited shouts of the crowd, "Here they come," stirred the blood of even the most sedate. The trotting track with its capacious grandstand was the heart of the fair. Here were held, also, such other spectacular features as displays of fireworks, military reviews, balloon ascensions ("a handsome couple to be married in the balloon while in the air"), the "grand cavalcade of livestock," wheelbarrow races, catching greased pigs, and other athletic events.

By 1870 the predominantly educational character of most early fairs was submerged in the rising tide of popular interest in amusements. In addition to horse racing, a multitude of other diversions engrossed the attention of spectators. Catch-penny side shows, some of which in former years had plied their trade on roads leading to the fairs, now were admitted to the exhibition grounds as income-producing concessions. The midway, with its raucous "barkers," became the most popular feature of the fair next to the race course. Here were to be seen—for a consideration—the boy with six fingers on each hand and eight toes on each foot; the two-headed calf; the dog-faced boy; the learned pig; the "World's Largest Fat Lady, weighing 610 pounds"; the "legless lady—she lives, she breathes!"; the snake enchantress; the Hindoo wonder worker; troops of scantily-clad and sinuous oriental dancers; gambling devices, and games of chance. Seeking greater profits on their investment, the management of Fair Associations, now no longer predominantly agricultural, licensed lewd and immoral exhibitions for large fees. The agricultural fair, which had been established to serve farmers, degenerated into a commercialized and urbanized amusement park.



Champion baby beef-steer, Farm Show

Many farmers became so disgusted that they ceased to attend fairs. In 1898 *National Stockman and Farmer* reported, "stock pens and agricultural halls nearly empty, and the attendance of farmers and their families materially decreased. . . . Most of the fairs have practically ceased to be agricultural, and cater wholly to the tastes of the sporting community."[66] A few associations tried to maintain wholesome fairs. In 1878 the Secretary of the Somerset County Agricultural Association stated, "Our constitution and by-laws prohibit all manner of gambling, horse-racing, side shows, and chance games. So far we have kept comparatively clear from these things, but the pressure for 'a little nonsense now and then,' can scarcely be resisted. . . . I frankly admit that we are gravitating, slowly but stubbornly, in [that] direction, and away from the main feature of an agricultural . . . fair."[67] In 1880 York County farmers were proud that their fair had "held twenty-one annual fairs, and has never allowed spiritous liquors of any kind, or gambling, on its grounds."[68] Subsequently, under pressure of economic expediency, this enviable record came to an end. In 1929, the York County Grange resolved: "WHEREAS, The York County Agricultural Society . . . have sold concessions to crooks of all kinds, to immoral and indecent shows and . . . made the midway and whole fair ground a place where . . . the average man or woman could not pass through without feeling a keen sense of shame, and . . . WHEREAS, The York County Fair has ceased to be a county fair but has become one big carnival, a place unsafe and unfit for many people and especially children to attend. Therefore, be it *Resolved,* That the York County Pomona Grange No. 40 . . . do hereby agree to cease to exhibit anything at the York County Fair until the agricultural society shall give to the citizens . . . a clean agricultural fair, as we used to have when there were yet some farmers on the agricultural board. . . ."[69]

In 1924 the Attorney General of Pennsylvania ruled that "It is illegal, as well as immoral, for the Fair Associations, . . . to arrange for, or permit the continuation of, any gambling devices, lewd or immoral shows, . . . at agricultural Fairs in this State"; and declared it the duty of the Secretary of Agriculture to refuse to allocate State aid to such fairs.[70] In compliance with the order of Secretary of Agriculture Frank P. Willets, fair managers agreed to scrutinize midway features more closely. For a time there was considerable improvement, but many fairs soon lapsed to their former low standards. About 1930 the Grange and other farm organizations initiated a campaign for clean fairs and urged farmers to boycott those that did not eliminate objectionable features. By 1940, greater emphasis was being placed on agricultural exhibits, and there were fewer unsavory midway shows.

After 1930, many county fairs began to stage the finals of county-wide horseshoe pitching contests, the preliminaries of which had been held by granges and other community organizations. Winners of county contests were eligible to compete in the State-wide contest at the Farm Show. In 1931 it was reported, "A number of our smaller county fair associations during the fair season just closed added to their programs such features as a county horseshoe pitching contest, pageants, in one or two cases dramatics by local people and events of like nature. They took on these features with skepticism, doubting their drawing power. A season's trial, however, has, we believe, convinced these officials that such features have a place on a fair program and that local people support them."[71] So the pendulum began to swing back toward the educational type of fair that had prevailed a century earlier.

The seventy-five out-of-door fairs of 1940, however, were very different in many respects from the fairs of 1840. Practically all rural people now came to them in automobiles instead of horse-drawn vehicles. There was far less visiting than in the old days when people lived at a more leisurely pace and had few opportunities to get together except at church. The exhibits were much more varied and represented commercial ideals. No longer were premiums offered for "the largest pumpkin." But the patch-work quilt, which seemed to be made of a million pieces, mute witness to the patient toil of a farm woman, was on exhibition as of yore.

The most significant recent development was the much greater participation of boys and girls in both exhibits and contests, especially in connection with Four-H and Future Farmers of America clubs. On livestock judging day the youthful contestants were up early; their baby beeves or calves must be washed and curried and their hooves and horns polished; horses must have their manes braided with bright-colored bunting; sheep must be given a final touch with the blocking shears; swine must submit to the flattering attention of the tonsorial artist. Fairs were becoming what they were intended to be—primarily educational and social, an intimate expression of rural life and progress.

STATE FARM SHOW

This important milestone in the history of Pennsylvania agriculture was a by-product of frustrated attempts to establish a State fair. For many years the agricultural leadership of the State, particularly the Livestock Breeders' Association and E. S. Bayard, editor of *National Stockman and Farmer*, sought to secure a State appropriation for this purpose, but their efforts were fruitless. Attention then turned to joint winter shows held in connection with meetings of the several state-wide educational organizations. As early as 1875, the State Horticultural Association, in cooperation with the State Board of Agriculture, held fruit shows in Harrisburg on legislative years. These attracted so much attention that in 1901 other organizations began to make small exhibits.

The Farm Show started as a Corn Show. On January 22-25, 1907, *National Stockman and Farmer,* the Livestock Breeders' Association, and the Dairy Union sponsored a Corn Show in Harrisburg in connection with meetings of the two farm organizations. This created much interest. The judge closed his work with a talk on corn breeding and seed selection, using the exhibits as illustrative material.[72] There was lively bidding when the prize-winning ears were sold at auction. In 1908 the Corn Show was held in Pittsburgh by the Livestock Breeders' Association alone; but in 1909, a legislative year, it again was staged in Harrisburg under the auspices of the three original sponsors. The exhibits were mainly corn (2,000 ears), but there were some dairy products.[73] In 1911 the State Horticultural Association joined the show; this was the first time that all the major State-wide organizations came together in their annual meetings and exhibits.

The 1912 meetings and exhibits were held at Pittsburgh on January 15-20. Although still called a Corn Show, the exhibits also included fruit, dairy products, and some farm supplies; this was the beginning of a midwinter fair. It was by far the most ambitious exhibit of the State Horticultural Association, comprising about 1,000 bushel boxes, 200 barrels, and 2,000 plates of apples. Unfortunately, sub-zero weather prevailed during the show and much of the fruit was frozen. Members of the Association who had advanced fifty dollars each to stage the show were not reimbursed.

In 1917, Secretary of Agriculture Charles E. Patton called together all the interested groups and reached the decision to widen the scope of the midwinter show to include all types of farm products.[74] "The first State Farm Show," says Miles Horst, "was arranged by a small group of agricultural leaders who met in Lancaster in August, 1916. They chose as Chairman E. S. Bayard, President of the Pennsylvania Breeders' and Dairymen's Association and Editor of *National Stockman and Farmer.* His leadership in Farm Show activities over the years contributed so much to its success that he might well be recognized as the 'Father of the Pennsylvania Farm Show.'"

In January, 1917, the Pennsylvania Department of Agriculture and The Pennsylvania State College joined the State-wide farm organizations in staging the first State Farm Products Show. It was designed to be a strictly educational exhibition, entirely free from the sporting features that had brought so many out-of-door fairs into disrepute. No admission fee was charged. It was organized and managed by farmers; but three interests had a part in the Show—farmers, public educational and regulatory agencies concerned with agriculture, and commercial exhibitors. On January 23, 1917, a sign was nailed to the entrance of a large farm implement building in Harrisburg bearing the legend, "Pennsylvania Corn, Fruit, Vegetable, Dairy Products and

Wool Show." Some commercial exhibits of farm machinery and implements were included. The competitive exhibits were set up by the Agricultural Extension staff; they occupied two floors of the building. Vocational schools in all parts of the State sent corn-judging teams to compete. This first Farm Show was under the direction of E. S. Bayard, Chairman of the committee, and Henry E. Klugh of the Pennsylvania Department of Agriculture, General Manager. The State Farm Show Committee was organized in 1917; it was composed of representatives of all State-wide organizations. This Committee administered the Show until 1927, when the State Farm Show Commission was appointed by the Governor and the Show passed under State control and was administered by Pennsylvania Department of Agriculture; thereafter the Commission served in an advisory capacity and nominated candidates for appointment on the Farm Show Commission.

The Farm Show of 1917 occupied about 10,000 square feet of exhibition space; the attendance was about 10,000.[75] Exhibits of butter, potatoes, small grains, hay, tobacco, eggs, and dressed poultry were added in 1918. The first dairy cattle, beef cattle, and swine were shown in 1921; and the first live poultry in 1923. Vocational School exhibits began in 1924, when over 50,000 visitors attended the Show. In 1927, home-economics exhibits were first staged. By 1930, the exhibits required 125,000 square feet of space.

All these years the Farm Show had been held in widely scattered buildings around Harrisburg, wherever space could be secured. In 1927 the General Assembly appropriated $450,000 to erect a combined Farm Show building and armory; this was vetoed by Governor John S. Fisher. In his message to the General Assembly in January, 1929, Governor Fisher recommended an appropriation of $1,290,000 to erect a building for the Farm Show. The legislature appropriated $1,340,000, plus $25,000 for preparation of land and for equipment. The building was erected on a forty-five acre tract on the outskirts of Harrisburg, at Cameron and Maclay Streets, near the site of the first State fair. The one-story building (except the front) covered about ten acres. It provided 125,000 square feet of floor space for competitive exhibits, a livestock-judging arena seating 3,000, six rooms for meetings of agricultural organizations, and 725 commercial exhibit booths each ten feet square. The last official act of Governor Fisher was to dedicate this building, on January 19, 1931. Attendance at the first show in the new building, in 1931, was 146,000.

By 1940 the Farm Show had become a great midwinter agricultural fair, by far the largest and most representative in the country. Resisting considerable pressure to admit midway attractions, the Farm Show Commission adhered to the original policy of maintaining it as a strictly educational affair. No admission was charged, and no sideshows were admitted. It had the united support of the State-wide farm organizations, the Pennsylvania Department of Agriculture, The Pennsylvania State College, the vocational schools, and other public agencies. In 1931 the General Assembly appropriated $100,000 for an addition to the Building and improvement of the grounds. In 1937 the General State Authority approved an allocation of $1,200,000 for the construction of a new arena seating 7,600 people, and for additional exhibition space. This was a Public Works Administration project; forty-five per cent of the cost was an outright federal grant, the balance was borne by the State. The new arena was first used at the 1939 Show.

In 1940 the Farm Show offered premiums amounting to $42,206; competition was open to farmers in any state. The number of exhibits that year was 10,524; the attendance, 510,000. The entries included 375 dairy cattle, 225 swine, 175 beef cattle, 326 sheep, 4,493 poultry, 244 exhibits of potatoes, 1,097 of apples, 775 of eggs, 1,123 of foods, and 1,114 of clothing. All of the sixty-seven counties of the State were represented. The Farm Show of 1940 was a magnified and modernized version of the Berkshire type of agricultural fair of 1825; it had a varied program of education and wholesome recreation, with none of the objectionable features that had crept into out-of-door fairs. The annual meetings of most State-wide farm organizations were held in Harrisburg during Farm Show week.

By far the most significant feature of the program was the large participation of farm youth, particularly the exhibits and contests of Four-H Club and Future Farmers of America boys and girls. In 1940, sixty-seven vocational school teams vied for honors in a series of demonstration and judging contests that ran through the six days of the Show. The first exhibit by a Four-H Baby Beef Club was that of Adams County in 1925; thereafter exhibits by farm youth increased rapidly until in 1937 more than 1,800 of the 10,000 farm and home competitive exhibits were entered by them. The F. F. A. State band of 100 boys from fifty-two counties was a center of attraction. Rural youth were responsible for two of the five evening entertainment programs in the New Arena, one by Four-H clubs and one by F. F. A. clubs. Other evening entertainments might include a demonstration of horsemanship by the Pennsylvania State Police, a Rural Talent Festival with 700 or more people participating in the pageant, a State horse-pulling contest, and a State horseshoe-pitching contest. The finals of a rural one-act-play contest were first staged at the Farm Show in 1931.

Pennsylvania farmers had reason to be proud of their State Farm Show; it was educational, wholesome, and the largest indoor agricultural exhibition in America in both exhibits and attendance.

XVI

AGRICULTURAL EDUCATION AND RESEARCH

THE most significant development in Pennsylvania agriculture between 1840 and 1940, especially after 1890, was the more general application of science to the art of farming. Rule-of-thumb farming, based on the personal experience of the farmer added to the accumulated experience of his forebears, was supplemented, though not wholly displaced, by farming based largely on the results of research. The odious epithet, "book farmer," was superseded by a wholesome respect for the teachings of science. Institutions and agencies for the discovery and dissemination of agricultural knowledge multiplied. Farming became an art which could be carried out scientifically. No longer was the farmer wholly at the mercy of the forces of nature; he guided these forces in considerable measure, the better to accomplish his purpose. He became co-partner with the Great First Cause.

REMNANTS OF SUPERSTITION

Rome was not built in a day; neither was superstition wholly banished within a century. Some remains, even at the present time. The most persistent of superstitions applied to agriculture, although one long since discredited by both science and practice, is moon farming. In 1838 a Monroe County farmer said, "In every district of country where I have resided, a general belief prevails of the influence of the *moon's phases* on vegetation, . . . together with a belief in the important influence of the *signs* [of the zodiac]. . . . A farmer has prepared his ground for Indian corn. It is in good condition; the season has come round, and all is favorable—*except the sign.* He must wait a week, perhaps, for the sign to travel on to *Aries,* in order that the ears of his anticipated crop may correspond in length with those members of the body. When at last the golden moment arrives, sad to state, a rain has set in . . . [which] may put to hazard his whole crop."[1]

In 1856 a committee of the Huntingdon County Agricultural Society made an investigation of lunar influence on agriculture. It reported, "At least two-thirds of all the persons engaged in Agriculture and Horticulture . . . regulate all their operations by the 'signs' or position of the moon in the zodiacal constellations"; but this committee declared itself unable to find any factual evidence whatever in support of moonology.[2] In spite of this and many other similar findings, some farmers continued to plant crops and to set hens in the increase of the moon. As late as 1930 a Pennsylvania farmer stated, "Last spring . . . I planted a row of potatoes in my garden when the moon was in the fruitful sign, Cancer. . . . Next to it I planted another row two days later when the moon was in the barren sign, Leo. . . . The yield of potatoes from the row planted in the fruitful sign was 22⅛ pounds, while that from the barren sign weighed but 11 pounds. . . . I conclude that there is comething in planting according to moon signs."[3] In the same year a Mifflin County farmer expressed majority sentiment: "So far as I am concerned, the moon might as well be dehorned."

The ancient superstition about the supposed transmutation of plants, particularly wheat into cheat (what German farmers called *roggentrespe*), still has a few adherents. Controversy on this subject in farm journals raged with particular vehemence from 1850 to 1865. Said one believer, "In the season of 1855, I sowed about one acre and a quarter of the six-rowed barley,—the seed was perfectly free from oats, and the ground so situated that it could not, by accident, be partially seeded with oats. . . . Just before the time for the heads to appear, one portion of my grain was bitten off by cattle and horses that broke into the field. . . . The portion which was so damaged, grew and came to maturity, but a large portion of it produced heads of oats, while the rest of the grain brought forth plentifully after its kind. . . . Incredulous as it may seem, I raised stocks of barley and others of oats on the same root."[4]

The prehistoric device of the water-witch or divining rod still is relied upon by some to locate a suitable place to drive a well. Said one of the elect in 1939, "Only those who are born in the sign of Aquarius or Waterman are able to find water with a peach fork. I know different persons were born in that sign and it always works and water is always found where it turns for them."[5]

The infallibility of the ground hog, or woodchuck, as a prophet of spring still is a cardinal article of the faith of many farmers:

"If ground-hog day was bright and fair,
   The beast came forth but not to stay;
His shadow turned him to his lair
   Where six weeks more he dormant lay,
So wondrous weather-wise was he."

Most of the good fairies, devils, witches, and other instruments of either a propitious or an unkind fate that formerly complicated the art of farming no longer roam the earth. The attitude of most farmers toward the onward sweep of science was expressed by a Chester County farmer in 1841: "When I consider what was thought by my father, fifty years ago, to be the truth in the theory and practice of agriculture but which now is laughed at as absurd, have I not the right to expect and believe in the continuance of progress?"

FARM JOURNALS

Before there was any considerable body of agricultural science and before agricultural colleges and experiment stations had begun to function effectively, farm journals were the most important means of disseminating information on improved methods of farming. Until after 1870, comparatively few working farmers were subscribers; the journals' clientele was mostly gentlemen farmers. The scorn of working farmers for "book farming" was so all-pervasive that in 1850 the *Cultivator* estimated that not one farmer in 2,000 subscribed to a farm journal. Compare with this the situation in 1913, when a survey of the northeastern states, including Pennsylvania, revealed that practically every farmer subscribed to at least one farm paper, and many to four or five.

Many of the articles and editorials in early farm journals were tedious and arid, but the numerous letters from farmers revealed the true condition of agriculture at the time. The journals provided opportunity for a free exchange of ideas and discoveries at a time when public agencies for such dissemination did not exist. A farmer who planned to build a milk house had only to request information through the columns of his farm paper and he received it from numerous sources.

Until about 1860 editors were much given to "puffing" in editorial columns articles offered for sale in advertising columns. Not infrequently they conducted a seed, fertilizer, or farm-machinery business on the side, the products of which were commended highly in editorials. The most notorious practitioner of this prostitution of editorial integrity was James J. Mapes, editor of *Working Farmer* and manufacturer of Mapes' Superphosphate of Lime. Even the editor of *Pennsylvania Farm Journal* was not averse to saying a good word for the products of his advertisers. In the issue of June, 1853, he wrote, "William C. Rudman, we perceive, holds some of his fine stock of poultry for sale. The *purity* of this stock can be relied upon, and those in want of such will do well to look after it. See his advertisement."

The advertisements of all sorts of palpable frauds were accepted. This practice was resented by farmers. In 1861 a Bradford County farmer asserted, "The agricultural journals of the present day are doing more to aid this nefarious work [of imposing upon farmers], than they are doing to advance the true interests of the tiller of the soil. . . . For years no paper, claiming to be a farmer's journal, has been taken for miles around me. The reason assigned for this is, that the products of fancy farming and nostrum advertisements is all that appears in these publications."[6] After 1870 most reputable farm journals gradually divorced their editorial columns from their advertising columns, but some continued to accept deceptive advertisements, particularly of patent medicines. *American Agriculturist* and *Rural New Yorker* were among the first to exclude obvious frauds.

The *Cultivator* (Albany, New York, 1834-1865) and *Farmers' Cabinet* (Philadelphia, 1836-1848) were the most widely read journals of their time. The *Cultivator* had few equals in agricultural journalism. It was influential in breaking down the prejudice of farmers against book farming. In 1842 a Beaver County subscriber wrote, "I planted corn after the directions found in your paper and doubled my crop. Farming here is done in a different way from what it was before our farmers commenced reading." *Country Gentleman* (Albany, New York, and Philadelphia, 1853 +), which succeeded the *Cultivator*, enjoyed considerable popularity in this State.

The first issue of *Farmers' Cabinet*, a monthly, later a semi-monthly, appeared July 1, 1836. The first editor was John Libby; in 1840 he was succeeded by James Pedder. This was the first strictly agricultural journal published in Pennsylvania and the only one during the twelve years of its existence. The average circulation for the first four years was 4,000. At a meeting of the Philadelphia Society for Promoting Agriculture on May 6, 1840, it was designated as the official organ of that Society. It aspired to be a national journal but gave particular attention to Pennsylvania agriculture. Beginning with volume V, the name was changed to *Farmers' Cabinet and American Herdbook;* thereafter it gave special attention to breeds of livestock. It was discontinued in 1848 "for lack of support."

For six years, 1851-1857, [Pennsylvania] *Farm Journal* was an admirable expression of Pennsylvania agriculture. It was well edited. The first editor, S. S. Haldeman of Columbia, was Professor of Natural History at the University of Pennsylvania. In 1852 he was succeeded by A. M. Spangler, and in 1853 by J. L. Darlington. In 1854 the State Agricultural Society resolved: "We approve of the Pennsylvania Farm Journal . . . that for the present it be adopted as the organ of the State Society."[7] It was recommended that the proceedings of the Society be published, also, in *American Farmer and Agricultural Journal*, or *Americanischer Bauer*, a German-language journal published in Harrisburg and edited by J. M. Beck.

In 1853 the *Pennsylvania Farm Journal* was moved from Lancaster to West Chester, and in 1855 to Philadelphia. This proved to be a mistake. After its name had been changed to *Farm Journal and Progressive Farmer*, in 1856, it sought to become a national journal and lost most of its support in Pennsylvania. In 1857 it was recorded, "The

PENNSYLVANIA FARM JOURNAL has been discontinued for want of support. . . . We believe the only agricultural journal now issued in the Keystone State, is a new one, published in the German language, at Allentown."[8] The *Farm Journal* of 1940, published at Philadelphia, is a descendant of the original paper of that name, with a number of lapses in publication.

The next important farm journal published in Pennsylvania was *Pennsylvania Farmer and Gardener* (Philadelphia, 1859-1864). It was a monthly edited by A. M. Spangler, who also published an annual *Yearbook of the Farm and Garden.* It was an excellent exponent of Pennsylvania agriculture; much space was devoted to letters from farmers. Evan Pugh, first President of the Farmers' High School, and a number of his students were regular contributors. It continued publication during the Civil War when there was practically no income from advertisements, but in 1864 it was forced to join the long list of defunct agricultural journals.

Practical Farmer (Philadelphia, 1863 +) began publication in 1855 as *Heart of the Home.* In 1863 this publication became *Practical Farmer and Rural Advertiser.* For several years thereafter it served Pennsylvania agriculture primarily; in 1871 it was said to be "the only *bona fide* farm journal in the state." In 1877 it was designated as the organ of the State Agricultural Society. After 1880 it sought a national circulation and ceased to reflect the special interests of Pennsylvania farmers.

Gardeners' Monthly (Philadelphia, 1859-1889), edited by Thomas Meehan, was the most widely circulated horticultural journal in the world next to *Gardeners' Chronicle* of London. It was very ably edited. From 1859 to 1864 it was the organ of the State Horticultural Association.

Other ships launched hopefully on the perilous sea of agricultural journalism before 1900, but soon wrecked, were:

Illustrated Floral Magazine (Philadelphia, 1832-1837).

Practical Farmer, later the *Practical Farmer, Silk Cultivator and Educators' Guide* (Mechanicsburg, 1837-1838), published by "An Association of Practical Farmers." Monthly.

Hoffy's Orchardists' Companion (Philadelphia, 1841). Quarterly.

The Florist and Horticultural Journal (Philadelphia, 1852-1854). Monthly.

Lancaster Farmer (Lancaster, 1854-1884). Published by the Lancaster County Agricultural Society. Chiefly of local interest.

Pennsylvania Farmer and Scientific Journal (Lancaster, 1844). Monthly.

Evans' Rural Economist (West Chester, 1861-1862). Monthly. An excellent journal while it lasted; cut off by the Civil War.

Farmers' Magazine and Rural Guide (Philadelphia, 1879-1880). Monthly.

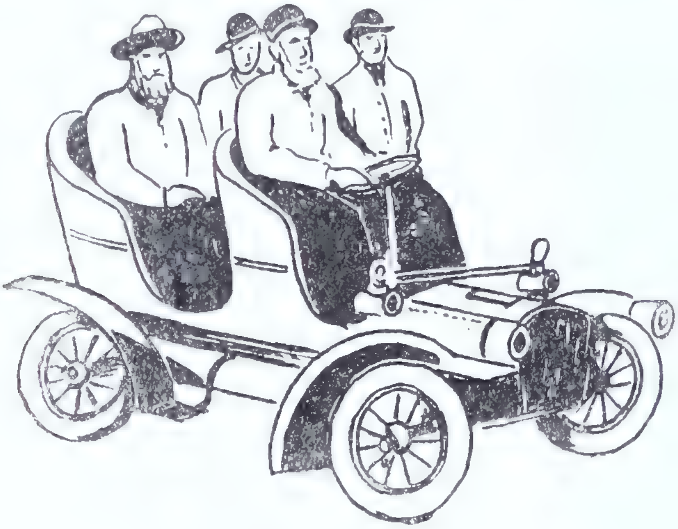
Farm and Garden (Philadelphia, 1881-1888). Semi-monthly.

Rural Farmer (Philadelphia, 1880-1913). Of little value to Pennsylvania farmers.

Meehan's Monthly (Philadelphia, 1891-1901).

Among the most valuable of farm journals were those published by the State Grange primarily for distribution to members of the Order. The *Farmers' Friend and Grange Advocate* (Mechanicsburg, 1874-1902), edited and published for many years by R. H. Thomas, largely at his own expense, was an excellent farm journal and a forceful organ of the Grange. The *Pennsylvania Grange News* (Chambersburg and Harrisburg, 1904 +) has admirably reflected current agricultural conditions and problems in this State.

Certain city and county newspapers have given much attention to agriculture. The most noted of these was the New York *Tribune*, when under the editorial supervision of Horace Greeley. After 1853 the weekly or semi-weekly *Tribune Farmer* had a large circulation in Pennsylvania. The Germantown *Telegraph* was the first urban newspaper in Pennsylvania to have an agricultural department;[9] this was started about 1830 and was continued until 1885. The Philadelphia *Inquirer*, Erie *Gazette*, and Sunbury *Gazette* also had strong agricultural departments between 1860 and 1875. Prior to 1890, several county newspapers had agricultural columns, mostly clippings.



Farmers' Institute force, 1900

After 1900, *National Stockman and Farmer* (Pittsburgh, 1877-1928) and *Pennsylvania Farmer* (Philadelphia and Harrisburg, 1912 +) were the outstanding journalistic exponents of Pennsylvania agriculture. The *Stockman* was born May 13, 1877, as a market-report sheet of the Pittsburgh stock yards, called *The Drovers' Price Current*. The first issue under the name Pittsburgh *Stockman and Farmer* was in 1880; in 1881 the name was changed to *National Stockman and Farmer*. Under the vigorous leadership of Edward S. Bayard, editor after 1889, this weekly magazine exerted a powerful influence on the development of Pennsylvania agriculture. On September 22, 1928, it was consolidated with *Pennsylvania Farmer* under the latter name.

Pennsylvania Farmer originated about 1893 as a local organ of the Grange at Meadville, Crawford County. Publication was suspended for several years, but in 1912 it was transferred to Philadelphia and soon developed into a forceful representative of Pennsylvania agriculture. The first editor, A. J. Anderson, was succeeded by R. P. Kester; after it was merged with *National Stockman and Farmer,* in 1928, E. S. Bayard became editor of the consolidated publication. At various times it has been a weekly and a semi-monthly. In 1927 it began to award the honor of "Master Farmer" each year to a limited number of men for outstanding success in farming and rural citizenship. In 1940 this journal went into seven out of every ten Pennsylvania farm homes.

Other current indigenous farm journals include: *Everybody's Poultry Magazine* (Hanover, 1897 +). In its early years it was published as *Poultry Farrier* and as *Fancy Fowls. Pennsylvania Farm Economics* (State College, 1939 +). This is a free publication of The Pennsylvania State College. Several of the State-wide agricultural organizations, as the State Poultry Society, State Horticultural Association, State Bee-Keepers' Association, and State Potato Growers' Association, have published excellent organs. Out-of-state journals that have had the widest circulation in Pennsylvania are *American Agriculturist* (1842 +), *Rural New Yorker,* 1850 +), *Hoard's Dairyman* (1870 +), and *Breeders' Gazette* (1881 +).

Few books on agriculture by Pennsylvania authors appeared between 1840 and 1860. Among these were:

Robert Buist, *American Flower-Garden Directory: . . .* (Philadelphia, 1839).

Frances S. Wiggins, *The American Farmers' Instructor or Practical Agriculturist* (Philadelphia, 1840).

James Pedder, *Frank; or, Dialogues Between a Father & Son on the Subjects of Agriculture, . . .* (Philadelphia, 1840).

Charles B. Trego, *A Geography of Pennsylvania . . .* (Philadelphia, 1843).

Robert Buist, *The Rose Manual* (Philadelphia, 1844).

Thomas H. Burrowes, *State-Book of Pennsylvania, . . .* (Philadelphia, 1846).

Robert Buist, *The Family Kitchen Gardener, . . .* (Philadelphia, 1847).

William Darlington, *Agricultural Botany; . . .* (Philadelphia, 1847).

William Darlington, *Memorials of John Bartram and Humphry Marshall; . . .* (Philadelphia, 1849).

W. D. Brinklé, *The American Pomologist* (Philadelphia, 1851).

William G. Waring, *The Fruit Growers' Hand-book* (Boalsburg, 1851).

William Bright, *Bright on Grape Culture* (Philadelphia, 1860).

After 1860 the trickle of agricultural books became a stream which has flowed with constantly increasing volume to this day.

FARMERS' INSTITUTES

For thirty years these rivalled farm journals as a means of disseminating information on farming. They developed out of the educational activities of the Philadelphia Society for Promoting Agriculture, the State Agricultural Society, and the State Board of Agriculture.

In 1852 the editor of *Pennsylvania Farm Journal,* possibly not speaking from a wholly unbiased point of view, said: "The employment of agricultural lecturers to travel the State, has been proposed [as a means of agricultural education]; but this would not be sufficiently practical; and it would be very difficult to collect audiences among a population which is necessarily thinly distributed."[10] In 1856 the Philadelphia Society "agreed to throw their room open to the members of all the County Societies of Pennsylvania and the adjacent counties of New Jersey, on Friday evening of each week, free of charge. . . . This is the first step of the kind which has been taken in this country."[11]

The State Board of Agriculture was established in 1876, primarily to enforce State laws relating to agriculture; but it became an important educational agency. Its annual reports contained a great variety of information on agriculture gleaned from widely scattered sources, and its quarterly meetings in different parts of the State were largely attended by farmers. The discussions of current farm problems at these meetings were so popular that a demand was created for an organized program of farmers' meetings.

The first Farmers' Institute in Pennsylvania was on May 22, 1877, at Harrisburg, under the sponsorship of the State Board of Agriculture.[12] Until 1885 the Board had no special appropriation for this purpose; most of the expense was borne by the communities served. In 1885 the General Assembly made an appropriation of $1,000 for Farmers' Institutes; this was increased to $3,000 in 1887, and to $7,000 in 1891. Six institutes were held in 1886, eighteen in 1888, and eighty-one in 1891. In 1895, when the Pennsylvania Department of Agriculture was organized, administrative responsibility for conducting institutes was transferred to that agency, but members of the Board continued to have charge of them in their respective counties. In 1895 John Hamilton of Centre County was appointed Director of Farmers' Institutes; under his vigorous leadership Pennsylvania became the foremost state in this phase of agricultural education.

Methods of conducting institutes varied greatly. Each county representative on the Board of Agriculture selected the time, place, and speakers, and conducted the meetings. The Secretary of the Board attended most of the institutes. The program was devoted primarily to "essays" by local speakers, but there was considerable discussion. By 1890 it was evident that centralized administration, a pre-arranged schedule, and better qualified speakers were necessary. John Hamilton put this policy into effect in 1895. In 1898, fifty paid institute speakers, divided into groups of three to six, were kept in the field from December 1 to April 1. In addition to these "State speakers" there were about 1,000 local speakers on the programs of the one four-day, 120 two-day, and sixty-five one-day institutes held that year.[13] The program in each county had local guidance: "The corps of institute managers is organized by counties; it is composed of the member of the State Board of Agriculture for the county and one representative elected or appointed by each agricultural, horticultural or other like organization in the county; this includes county Pomona granges and Alliances."[14]

An entire session might be devoted to some subject of general interest prescribed by the Director of Institutes, as "Good Roads" or "Better Rural Schools." The programs were enlivened by music and other entertainment features. As part of the "educational session" of the Farmers' Institute at Tionesta, Forest County, in 1899, a young farmer and his sweetheart were married "amid great enthusiasm." Evening sessions were devoted to "inspirational addresses" which usually were quite remote from rural life. Occasionally there were exhibits and demonstrations. Institutes commonly were held during the winter months in village churches or Grange halls, but a few were held in summer out-of-doors. The essays and part of the discussions were reported in *Agriculture of Pennsylvania.*

By 1889 Farmers' Institutes were the most popular type of agricultural education. One or more were held in every county. Sessions for farm women were scheduled; these were devoted to problems of home-making. In 1898 the aggregate attendance was 50,000, an average of 279 to an institute. In 1890 the institute at Black Barren Springs, Lancaster County, "was attended by about five thousand people. . . . There were near twelve hundred [vehicles] of all descriptions, besides many horseman and on foot."[15] The first Round-up Institute or Normal Institute was held in 1899; it was attended by speakers, local managers, and representatives of agricultural societies. Programs, methods of presentation, and current problems were discussed.

In 1904 Movable Schools of Agriculture were begun. A corps of speakers travelled continuously over the State giving instruction in a specialized field, as dairying, poultry, or fruit growing. Laboratory practice was given as well as lectures. Commonly the schools were of three or four days duration. Said *Pennsylvania Farmer* in 1912, "The movable institute schools now being conducted in different parts of the State . . . are in line with the general movement toward the introduction of scientific as well as practical agricultural instruction. . . . The movable school is the middle ground between the old-time institute and the college short course."[16]

After 1900 there was a demand for farm demonstrations and for personal assistance to farmers in addition to the speaking program. John Hamilton sensed this need: "The time has now arrived," he said in 1900, "when Pennsylvania should take a step in advance, in this Institute work. . . . We need to get down closer to the actual work upon the farm . . . by personal visitation, to the workers on the farms, to the creameries and cheese factories, the dairies and herds, the orchards and viney acres, the gardens and greenhouses, carrying information to these workers . . . by practical demonstration."[17] This was a forerunner of Agricultural Extension. The General Assembly, however, did not provide the $25,000 a year that was requested for this purpose.

The demand for speakers who were trained specialists rather than good general farmers increased. A considerable number were from the staff of the School of Agriculture. Said the Director of Farmers' Institutes in 1902, "The Farmers' Institutes are organized to supplement the Agricultural College and Experiment Station by disseminating information on agriculture throughout the state in a shape to be applied on the farm." In 1911 an Agricultural Extension Bill providing an appropriation of $60,000 for the biennium passed the House but not the Senate of the General Assembly; the money was to be used by the Pennsylvania Department of Agriculture "to employ field advisers and for making farm demonstrations."[18]

Farmers' Institutes were at the height of their influence in 1913. Attendance that year reached 208,000, and there were more than 1,000 applications for institutes that could not be met because of limited funds—$45,000 for the biennium. For a number of years the banner institute in attendance was Red Lion, York County; in 1916 there were 1,500 at one session and the total attendance was 4,300. The Red Lion Cooperative Farmers' Association, organized in 1913, was a stock company which built a hall for institutes seating 1,500. Subsequently it became a buying and selling cooperative and conducted a fair.

The program of field demonstrations envisioned by John Hamilton in 1900 as a supplement to Farmers' Institutes was realized in 1913. On May 14 of that year the General Assembly authorized the Secretary of Agriculture to appoint "ten citizens of the Commonwealth, who shall be qualified by actual experience for such work, as special instructors in the Science of Agriculture and the demonstration of approved agricultural methods." The sum of $40,000 for the biennium was appropriated for this purpose. The Secretary of Agriculture organized a Bureau of Farm Advisors who were employed to visit farms and counsel with farmers. All were former Farmers' Institute lecturers and all were working farmers. Two were specialists in dairying and animal husbandry, two in poultry husbandry, two in farm crops, one in horticulture, one in soils, one in agricultural cooperation, and one in home-making.[19] They were expected to be in the field during summer months and to join the institute force in winter.

The Farm Advisors began work August 1, 1913. By December 1 they had visited 2,000 farms. In 1915 they visited 7,665 farms, and in 1916 approximately 10,000 farms besides addressing 300,000 farm people.[20] The nature of the counsel given by one adviser in 1916 was reported: "The Farm Advisers of the [Pennsylvania] Department [of Agriculture] did the following work on a single farm: 'Tested soils, suggested place for truck crops on farm, examined alfalfa, showed where to plant millet, made up fertilizer formula for corn, located where to sow alfalfa in future and where to plant potatoes this spring, . . . ' "[21]

The work of Farm Advisors was a duplication of the work of the Agricultural Extension Service of The Pennsylvania State College, especially after the passage of the federal Smith-Lever Agricultural Extension Act of May 8, 1914. In 1915 the State Economy and Efficiency Commission recommended that the advisors be dispensed with, "since the Farm Bureau system of State College makes them a duplication." State-wide farm organizations, especially the Grange, urged the adoption of this recommendation. The State appropriation for Farm Advisors was discontinued in 1917. The State appropriation for Farmers' Institutes was continued until 1921. Pennsylvania Department of Agriculture continued to conduct a few Farmers' Institutes, using other funds, until 1927. Some rural communities held institutes for several years thereafter, using local funds; the forty-seventh annual Farmers' Institute at Canonsburg was held on February 4-5, 1937. For the most part, however, Farmers' Institutes were superseded after 1917 by the program of Agricultural Extension.

For thirty years Farmers' Institutes were a major factor in the development of Pennsylvania agriculture. At their best, they awakened dormant farming communities into new life, stimulated helpful discussion on methods of farming, resulted in improved farm practices, and paved the way for Agricultural Extension. They also were an important social event in many rural communities. With the development of specialized agriculture, faster means of transportation, and the more general application of science in farming, Farmers' Institutes gave way to the more technical and more personalized service of Agricultural Extension.

FOUNDING OF THE FARMERS' HIGH SCHOOL

The general indifference of working farmers to organized agricultural education and research prior to 1850 was not shared by gentlemen farmers of the Philadelphia Society for Promoting Agriculture and by a few other wealthy patrons of agriculture throughout the State. In 1854 an Allegheny County farmer wrote to the *Cultivator,* "In oratorical displays before agricultural societies it is claimed that the successful farmer must have a knowledge of chemistry. This is all wrong. The farmer's business is with results, not theories. What important discovery has chemistry brought to the aid of the practical farmer?" Quite the opposite point of view was expressed by Frederick Watts of Cumberland County in 1852: "In my practical operations on the farm, I have made it a rule to doubt all *dogmas.* That theory for which no reason has been assigned, and none can be imagined, should be suspected, at least."[22] Initiative in the movement to found an institution devoted to instruction and research in agricultural science in Pennsylvania came almost wholly from a few college-educated and well-to-do gentlemen farmers rather than from the great body of working farmers.

In 1849 Jonathan Turner of Illinois began to campaign for the establishment by Congress of "industrial universities." Not until the passage of the Morrill Act in 1862 was this hope realized. In the meantime, the leaven of agricultural education was working in Pennsylvania. Spurred by repeated representations to the General Assembly by the Philadelphia Society for Promoting Agriculture, the State Superintendent of Common Schools, A. L. Russell, recommended in 1851 that there be established a State Agricultural Institution accommodating 500 pupils of which 300 were to be selected from the public schools and educated at the expense of the State during a period of six years from the age of twelve. One thousand acres of land was proposed for the institution and eight professors, including a Professor of Practical Farming and Rural Agriculture and a Professor of Agricultural Chemistry, General Chemistry, Geology, and Botany.[23] This proposal fell on deaf legislative ears but its proponents continued to agitate the issue.

At its annual meeting on January 18, 1853, the State Agricultural Society, then dominated by gentlemen farmers, took this action: "*Resolved:* That the Pennsylvania State Agricultural Society highly approves of and concurs in the recommendation of the Governor [William Bigler] in his annual message, that an institution to impart instruction in the Science of Agriculture should be established, and that legislative provision be made for the appointment of a State Agricultural Chemist."[24] A committee was appointed "to inquire into the expediency of adopting measures for the establishment of a State Agricultural School to be called the Farmers' High School of Pennsylvania." Frederick Watts was chairman of the committee. On January 20, 1853, the committee presented a plan for the School. It was recommended that a convention of delegates be held on March 8, 1853, at

Harrisburg, these "to be chosen by the county agricultural societies of each county; if none, by friends of agricultural education."

The convention met on the date set. One or more delegates were present from thirty-seven counties, the largest number being from the Philadelphia Society for Promoting Agriculture (9) and the Allegheny County Agricultural Society (8). A committee of which Frederick Watts was chairman recommended, "To combine practice with theory, to learn the reasons of things, and to acquire, by experience, the whole routine of a farmer's life, are the great purposes in the establishment of this school."[25]

In reporting this action to Governor William Bigler, Frederick Watts stated, "With an unparalleled unanimity [the convention] recommended the establishment of a school for the education of Farmers. . . . It must be conceded, that our institutions of learning, as at present constituted, are not adapted to the education of young men for the business of agriculture. . . . They should be taught the English language, mathematics, geography, chemistry, botany, astronomy and such other kindred subjects as are practically useful; and with these, the art of farming."[26]

The State Agricultural Society submitted this modest estimate of the initial expense required:

A farm of 300 acres, with house and barn	$18,000
Additional buildings for the accommodation of boys	10,000
Livestock, implements, etc.	3,000
Furniture, books, instruments, etc.	5,000
Contingencies of organization	2,000
	$38,000

It was suggested that this expense be met by:

State appropriation	$20,000
Contributions of the State Agricultural Society	10,000
Mortgage on the property	8,000
	$38,000

The annual operating expense was estimated at $16,000, including the salaries of four professors. It was suggested that this be met by an annual appropriation of $5,000 by the State Agricultural Society, by income from the sale of farm produce, and by tuition from an estimated 200 pupils "at $75 each, to include all expenses at the institution."[27]

Frederick Watts has been called "The father of The Pennsylvania State College." He was most active in the preliminary planning and in carrying forward the plans to a successful conclusion. He was

Frederick K. Watts

ably seconded by Hugh N. McAllister of Bellefonte and A. L. Elwyn of Chester County. In 1852 Mr. Elwyn had proposed that an agricultural school be founded "by the subscriptions of individuals in the form of stock. A farm of a sufficient number of acres could be purchased, in a central and easily accessible part of Pennsylvania, for fifteen or twenty thousand dollars. . . . It is to be supposed the school and the farm will do a good deal more than pay the expenses." The editor of *Pennsylvania Farm Journal,* supporting Elwyn's proposal, observed that "Although several communications on the subject of a State Agricultural College in Pennsylvania, have from time to time appeared in our columns, we never believed it possible to establish one, or if established, to render it of any practical utility to the sons of our farmers generally."[28]

Three days after the delegate convention adjourned, a bill entitled "An Act to establish an Agricultural School" was introduced in the Senate, but it failed to pass, primarily because the time previously set for adjournment was near. During the following year friends of the measure were active in its behalf. They were encouraged by the bequest of Elliot Cresson of Philadelphia, a member of the Philadelphia Society for Promoting Agriculture, of $5,000 to the State Agricultural Society to be used in founding an agricultural college.[29] On April 13, 1854, the General Assembly passed an Act to establish "an institution for the education of youth in the various branches of science, learning and practical agriculture as they are connected with each other, by the name, style and title of The Farmers' High School of Pennsylvania." The Act provided that the principal of the school should be "a good, practical farmer with whatever scientific attainments the Board shall deem necessary." The trustees were authorized to employ "such professors, teachers or tutors, as shall be qualified to impart to pupils, under their charge, a knowledge of the English language, grammar, geography, history, mathematics, chemistry, and such other branches of the natural and exact sciences, as will conduce to the proper education of a farmer."[30]

Unfortunately, this Act was unworkable, not only because it carried no appropriation but also because it provided for a board of trustees so unwieldly and unstable that it could not administer successfully an educational institution; it consisted of "The President and Vice-President of the State Agricultural Society, and the Presidents of each of the several County Agricultural Societies which shall, at any time, have been organized more than one year." Bitterly disappointed, Frederick Watts declared, "I do not think that anything practically useful could be established upon the basis of the act 'to incorporate the Farmers' High School of Pennsylvania' . . . Farmers ask that a school may be incorporated and based upon principles of teaching their art. . . . The answer [of the Legislature] is an act of incorporation, which is stupid and senseless in every feature, having a board of trustees of twenty-five or seventy-five, as the case may be, so situate that they never can be got together; and if convened once the same persons would probably never be got together again."[31]

Several attempts were made to secure a quorum of the trustees, but without success. A committee consisting of Frederick Watts, A. L. Elwyn, and George W. Woodward, all members of the Philadelphia Society for Promoting Agriculture, was appointed to "address the people of the State on the issue and to prepare proposed amendments for legislation." On February 22, 1855, Governor James Pollock approved a revised charter. This provided for a board of trustees of thirteen, four of whom (the Governor, Secretary of the Commonwealth, President of the State Agricultural Society, and the Principal of the Institution) were to be *ex-officio* members; nine others were named in the charter.[32] Seven of these nine are worthy of note; they were A. L. Elwyn and Algernon S. Roberts of Philadelphia, H. N. McAllister of Centre County, Robert C. Walker of Allegheny County, John Strohm of Lancaster County, A. O. Hiester of Dauphin County, and Frederick Watts of Cumberland County. Most of them were graduates of liberal arts colleges. Seven were lawyers. Farming was the primary interest of only three, but all were ardent patrons of agriculture.

The General Assembly appropriated $10,000 to establish the school and the State Agricultural Society undertook to raise a like amount. Frederick Watts was elected the first President of the board of trustees. A committee of which he was chairman was appointed to examine proposed sites and to recommend one to the board. James Miles offered to donate 200 acres of good land in Girard Township, Erie County, and sites were offered in several other counties. In 1857 the committee recommended acceptance of the offer of General James Irvin of Centre County. This included the donation of 200 acres of good limestone valley land with the privilege of leasing and ultimately purchasing 200 acres adjoining. Citizens of the county agreed to subscribe $10,000 to the project.

It was thought that an agricultural school should be remote from the distractions of urban life. In 1857 George W. Woodward stated, "The school will be some twenty miles from the Central railroad [now the main line of the Pennsylvania Railroad], and, in my judgement, that is near enough. Boys had better be away from the temptations and annoyances peculiar to railroads, whilst acquiring education."[33] The location selected was condemned by partisans for sites in other parts of the State; a writer in the Reading *Gazette and Democrat* said it was entirely unsuitable as to quality of soil, water supply, and healthfulness.[34]

Immediate steps were taken to fulfill the obligations of the charter. William G. Waring of Tyrone was appointed Superintendent and Professor of Horticulture; he was charged with responsibility for overseeing construction of the buildings and laying out the farm. A building of native limestone, 230 feet long and five stories high, with two wings, was begun (Old Main); its estimated cost was $55,000. Field experiments were started on the farm, and nurseries and orchards planted.

The Farmers' High School, 1856

OPENING OF THE FARMERS' HIGH SCHOOL

Then followed a trying period of preparation for the opening of the school. The trustees were handicapped by inadequate finances. A few well-to-do patrons of agriculture and a number of county agricultural societies came to its support. Between 1857 and 1860 the sum of $21,981.50 was subscribed. Hugh N. McAllister of Bellefonte collected most of this money.[35]

In 1858 the Chester County Agricultural Society sent delegates to the first election of trustees by county societies. They reported, "They left home on Tuesday, the 31st of August, in the morning, and arrived at Spruce Creek, in Huntingdon County, in the evening. At this place we met with delegates from various other county societies. . . . Early in the morning we left the railroad in coaches provided by the trustees, and arrived at the farm at eleven o'clock. We spent an hour in walking over the grounds and examining the grain, vegetables and implements. . . . At twelve o'clock the election [of trustees] was held. . . . After the election we visited the barn, the most attractive feature of which we found to be a *table,* well loaded with 'creature comforts,' and capable of seating eighty or one hundred guests. . . . Judge Watts addressed the meeting upon various topics of interest related to the farm school. . . . The delegates were under the necessity of returning home that evening, there being no accommodations, as yet, on the farm. The meeting adjourned at four o'clock, in time for the delegates to reach the railroad at Spruce Creek and take the evening train."[36]

On December 7, 1859, the trustees elected Evan Pugh (1828-1864) of Chester County as president. It was an admirable selection. He was not only conversant with practical agriculture from his boyhood days on a Chester County farm, but also had excellent scientific training. He had studied agricultural chemistry at universities in Germany and France and at the world-famous agricultural experiment station at Rothamsted, England. The first catalog was issued in 1859. It stated, "The object of the Farmers' High School of Pennsylvania is to afford a system of instruction . . . which shall embrace to the fullest extent possible those departments of all sciences which have a practical or theoretical bearing upon agriculture." Three hours of labor on the farm, daily, were required of all students. After 1866 military drill was substituted for this requirement.

The Farmers' High School opened February 16, 1859. Dr. Pugh thus described the event: "Over one hundred pupils had engaged places and sixty-nine were present on the first day. . . . The School was opened under innumerable difficulties and disadvantages. The buildings were only partly finished and in the absence of the intended dining room and kitchen a board shantee, which could neither be kept warm in cold nor dry in stormy weather, was used to cook and eat in. Proper apartments for museums, laboratories and recitation rooms were wanting. The farm was still rough and the lumber, brick and stone for the completion of the building were piled around on all sides in shapeless masses, rendering it almost impossible to get about and presenting a most forlorn aspect to the students who first entered the School through the well-tramped mud of the breaking up of the winter frosts."[37] Evidently these untoward circumstances did not conduce to good discipline; for the following year it was reported, "The introduction of rigid, systematic discipline, coupled with attractive methods of imparting instruction, have had their legitimate effects. The pupils, who last year were somewhat disposed to insubordination, have yielded gracefully to authority."[38]

The cost of attending the Farmers' High School was not excessive as judged by present standards: "The sum charged for tuition, lodging, boarding, washing and fuel is $100 per annum. The additional expense for light, books and laboratory fees is trifling."[39] On April 18, 1861, the General Assembly appropriated $49,900 to complete the building. In May of that year the first class of eleven students graduated with the degree of Bachelor of Scientific Agriculture. Most of them had specialized in agricultural chemistry under Dr. Pugh. In 1862 five persons comprised the entire faculty. These were:

Evan Pugh, President; Professor of Chemistry, Scientific and Practical Agriculture, Mineralogy and Analytical Mechanics.

David Wilson, Vice-President; Professor of the English Language and Literature, Moral and Intellectual Philosophy and Superintendent of the Agricultural Department.

William G. Waring, Professor of Horticulture, Superintendent of Gardens and Nurseries.

J. S. Whitman, Professor of Botany, Physiology, Zoology, Veterinary Medicine and Geology.

R. C. Allison, Professor of Mathematics, Astronomy and Natural Philosophy.

Financial difficulties incident to the Civil War made it difficult to operate the School, and enrollment was greatly reduced. In 1862, largely through the efforts of Dr. Pugh, the name of the institution was changed to Agricultural College of Pennsylvania, as more accurately indicating its collegiate character; in 1874 it became The Pennsylvania State College.

On July 2, 1862, while the nation was in the throes of the Civil War, President Abraham Lincoln signed the first Morrill Act. Under it the federal government made a grant of public land in the West for the endowment of a "land grant college" in each state. The General Assembly accepted the provisions of the Act on April 1, 1863, and designated the Agricultural College of Pennsylvania as the land-grant college of the State. Several privately-owned colleges besought the Legislature to divide the fund among them. Dr. Pugh argued this issue before the Judiciary Committee of the House: "Literary Colleges and Industrial Colleges should be kept distinct from each other. Shall the industrial classes of our state have one first-class College, devoted solely to their interests, or shall the means by which such an institution might be supported be dissipated among a number of institutions?" His argument was convincing.

The Morrill Act provided that the main objective of the land-grant colleges should be, "without excluding other scientific and classical subjects and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts . . . in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." Eastern labor organizations were influential allies of agricultural leaders in securing the passage of this legislation. The land allotted (30,000 acres for each Congressman and Senator), amounted to 780,000 acres. Unfortunately the land script of Pennsylvania was sold hurriedly and yielded only $438,186. Of this amount, $43,866 was used to purchase three Experimental Farms, one at the College and one each in the eastern and western parts of the State; the remainder was invested as endowment.

In spite of heavy handicaps, the quality of instruction offered during the first few years, especially in agricultural chemistry by Dr. Pugh, was excellent for that period. In 1864 Professor G. C. Caldwell of New York asserted, "There is no other agricultural college in the country where scientific and practical agriculture can be studied so well as at the Agricultural College of Pennsylvania. . . . Pennsylvania may well be proud of this her offspring."[40]

EARLY YEARS OF THE PENNSYLVANIA STATE COLLEGE

This auspicious beginning was of short duration. The untimely death of Dr. Pugh in 1864 was a very severe blow to the institution. There followed a succession of Presidents, each of brief tenure and, for the most part, weak administration. The number of students declined, the institution was seriously embarrassed financially, and public confidence in it was shaken. Some of the Presidents were not in sympathy with the industrial objectives of the College; it tended to become an institution for literary and scientific training, to the neglect of agriculture. In 1866 a committee of the Philadelphia Society for Promoting Agriculture visited the College and reported, "The institution was in a sadly deficient condition. . . . No one but a farm hand was engaged to give any instruction to the decreasing number of students."[41]

In 1872 a delegate from York County to the annual meeting for the election of trustees voiced his profound dissatisfaction with what he saw on the campus: "Imagine a building six mortal stories in height

. . . in a place where land is, or ought to be, dog cheap. . . . But, the building is not only too high, it is very badly built besides. . . . The stables . . . were Augean in their filth. And in many respects a stigma on a respectable York or Berks county farm. . . . It has not one single element of an agricultural school about it. . . . Its female addition is a terrible mistake . . . it is not fit for females at all. . . . As for the trustees of this ill-fated, abortive institution, we know of no language sufficient wherewith to condemn them."[42]

During the next few years public condemnation of the College mounted high, especially among farmers. In 1879 it had 155 students, of whom seventy-seven were in the Preparatory Department and forty were girls, most of whom were local. Practically all were in the scientific or classical curricula. "There were very few students who come from farms, or who purpose devoting themselves to agricultural pursuits. . . . It is almost impossible to get a sufficient number of such delegates [from agricultural organizations] to attend any annual election of trustees."[43] In 1880 a Northampton County farmer fervently declared, "The institution . . . is better fitted for a prison than an agricultural college. . . . I say God help those who have to go there to prosecute their studies."[44] In 1880 the State Grange crystallized the disgust of Pennsylvania farmers generally at conditions at the College: "We call upon the trustees of the college to at once terminate the protracted and inexcusable deficiencies in the department of agriculture."[45] In 1883 a speaker at the State Dairymen's Association asserted bitterly, "A great many thousands of dollars have been appropriated to the State Agricultural College. I have never heard that it did the farmers any good. It might be of good to the professors."[46]

The height of vindictiveness against the College was reached in 1883, when Governor Robert E. Pattison vetoed a bill providing for the establishment of an Agricultural Experiment Station at the College in these stinging words: "The past history of The State Agricultural College is not such as to induce the belief that any practical good ever has or ever will come from it. . . . This College never had the support or confidence of the people. They would not send their children to it, even though the institution has been imploring for pupils and offering most inviting inducements. The farming communities of the State are absolutely indifferent about the existence of this College, and do not believe it of any use."[47]

The first member of the College staff to win the unqualified approval of farmers, after Dr. Pugh, was William H. Jordan. He served as Professor of Agriculture and Agricultural Chemistry from 1881 to 1885. He reorganized the agricultural curriculum and established the Jordan Soil Fertility Plots, now the oldest in the country. He initiated fundamental research on animal nutrition. On his withdrawal from the college the State Board of Agriculture resolved: "We desire to testify to our appreciation of his worth and of his work in our State in the cause of scientific agriculture."[48]

The upward turn in the affairs of the College came in 1883, when George W. Atherton became President. Under his vigorous leadership it made substantial growth not only in physical plant and enrollment but also in public confidence. In 1883 the General Assembly appropriated $100,000 for buildings and equipment; this was the first State appropriation for buildings since 1861. None of this sum, however, was used for agricultural buildings except $5,000 for a botanical laboratory and greenhouse.

The establishment of the Agricultural Experiment Station in 1887 by the federal government marked the beginning of better public relations between the College and farmers. Very few farmers sent their sons to the institution for an education, but they began to utilize the results of agricultural research. The Experiment Station dominated the School of Agriculture until after 1900. Director Henry P. Armsby's *Manual of Cattle Feeding,* published in 1892, received wide commendation from farmers.

Until after 1900, enrollment in agriculture was very meager while the curricula in Engineering, General Science, and Liberal Arts were well filled. This was due in part to the prolonged depression in agriculture which deterred young men from entering this professional field; in part to the unprecedented demand for engineers to man the rapidly expanding industries of the State; but mostly to the continued lack of confidence of farmers in scientific agriculture. In 1896 a Berks County farmer expressed the majority sentiment of his time: "When a farmer's son has received a good common school education I think he is very well fitted for the calling of a farmer. Book farmers have not been a success." Financial support of agricultural instruction continued to be limited. Lack of an adequate body of knowledge based on research made instruction in agriculture rather empirical. The demand for college-trained men for professional positions in agriculture was insignificant as compared with the demand for graduates in engineering. For these reasons the College continued to stress engineering to the almost complete exclusion of agriculture. In 1894 only one student was enrolled in the degree curriculum in agriculture, out of a total enrollment of 221; but the Winter Short Courses in Agriculture had begun to attract attention.

EXPANDING PROGRAM OF THE SCHOOL OF AGRICULTURE

The turning point in agricultural instruction was reached in 1900. Despairing of securing more adequate facilities for the School of Agriculture through the College administration, farmers took the issue into their own hands. On June 4-5, 1900, representatives of the Grange, the State Board of Agriculture, and State-wide agricultural organizations met at the College and resolved: "We request the State Legislature to make a sufficient appropriation for the erection and maintenance at The Pennsylvania State College of a suitable building for the teaching of the different branches of Agriculture." A committee was appointed to introduce in the General Assembly an "Agricultural Conference Bill." This provided $100,000 for buildings to house agriculture and forestry, $10,000 for the publication of nature-study leaflets, and $20,000 for extension work in agriculture. Up to this time agricultural instruction had been given in part of the Experiment Station building and in several small frame structures, chief of which was "Hemlock Hall."

Responding to this appeal, in 1901 the General Assembly appropriated $100,000 for agricultural buildings and recommended that $150,000 more be made available at the 1903 session. "Perhaps the most gratifying feature of this unanimous action of the Legislature," said President George W. Atherton, "is the fact that it was taken not in response to a request of the College, but through the persistent and intelligent efforts of The Allied Agricultural organizations of the State."[49] The appropriation was used to erect and equip the first Dairy Building, now Patterson Hall. At that time there were only fifteen four-year students in agriculture, out of a total college enrollment of 547. At the instance of the same aroused farm organizations, in 1903 the General Assembly appropriated $150,000 for agricultural buildings; this fund was used to erect the Agriculture Building and several small service buildings.

The School of Agriculture now was fairly launched on an expanding program of service to its farmer constituency. It should be emphasized that this was a farmer-sponsored movement. According to Dean Henry P. Armsby, "The movement . . . which culminated in the passage of that act [providing for the construction of an agricultural building at the College], really had its inception in the meeting of the Dairy Union at West Chester [in 1899]. . . . At that meeting a committee was appointed to consider the state of dairy education in Pennsylvania. Later in the same year other agricultural organizations, the Grange and the State Board of Agriculture, took similar action . . . and the State Board of Agriculture finally took the initiative in calling the conference in what has come to be called the Allied Organizations."[50] In 1906 *National Stockman and Farmer* commented, "The farmers of Pennsylvania have taken more interest in and given more support to Pennsylvania State College in the past five years than in all the previous years of its history. . . . They have seen how agricultural education has lagged behind at State College and they have determined to force it to the fore."[51]

In 1906 Henry P. Armsby resigned as Dean and Director of Agriculture in order to devote all his time to research as Director of the Institute of Animal Nutrition, which was organized in 1905. Thomas F. Hunt succeeded him. Having made a good beginning in their efforts to build up the School of Agriculture, the farm leaders did not relax their efforts. A period of great agricultural prosperity was at hand. Farmers were evidencing much more interest in the application of science to farming. The Agricultural Experiment Stations were developing a large body of tested knowledge based on research, which was available for use in the classroom. All these circumstances were propitious for the great advance in agricultural education that followed.

A group of new buildings on "Ag Hill" costing about $300,000 and comprising the agriculture building, the first dairy building, and the calorimeter building was dedicated on Pennsylvania Day, November 22, 1907, with an address by Governor Edwin S. Stewart. Until that time instruction in agriculture had been secondary to the Agricultural Experiment Station; now it became the major function. The Department of Agriculture was succeeded by a School comprising separate departments of Agronomy, Dairy Husbandry, Animal Husbandry, Horticulture, and Forestry. In 1906 the Two-Year Course in Agriculture was begun. In 1907 Alva Agee was appointed Director of Agricultural Extension. In all its three functions—instruction, research, and extension—the School of Agriculture quickened into new life.

The appreciative response of farmers was evidenced by a remarkable increase in enrollment.

College Year	*Number enrolled in Four-Year Curricula in Agriculture*	*Number enrolled in Two-Year Course*
1906-7	45	14
1907-8	90	24
1908-9	133	40
1911-1912	514	181
1914-1915	767	248

In 1914-1915 practically half the students at The Pennsylvania State College were enrolled in the School of Agriculture.

Further expansion of the physical plant came rapidly, mainly through the efforts of farm organizations. In 1913 the General Assembly appropriated funds to complete the Horticulture Building and erect the dairy barn and stock judging pavilion. They were dedicated November 14, 1914. A new dairy husbandry and creamery building was dedicated August 25, 1932. Subsequently other major buildings were made available and new departments added as specialized fields of agriculture developed. The Department of Agricultural Education was established in 1911.

The School of Agriculture faced a major crisis in September, 1912, when Dean Thomas F. Hunt, becoming dissatisfied with administrative financial policies as related to agriculture, left the institution, taking with him some of the strongest members of the staff. Others followed. Said *National Stockman and Farmer,* "The loss of Professors Hunt, Agee, Baker, Cochel, Van Norman and others has aroused the farmers of this state as nothing else could have done."[52] In his report on the issue to the Board of Trustees, President Edwin E. Sparks said, "I can promise you that the School of Agriculture will take the place in the state which the people demand for it." In 1913 Ralph L. Watts was appointed Dean and Director; he quickly rebuilt the staff and public confidence in the School was restored. During the thirty years of his tenure it expanded greatly in staff, physical plant, and service to the Commonwealth.

Tangible evidence of the esteem in which the College was held by farmers was given in 1922 in connection with the emergency building campaign to raise $2,000,000 for health and welfare buildings, in the absence of State appropriations for this purpose. On August 23, 1922, ground was broken for a hospital; it was announced that the potato growers of the State had pledged $134,000 toward the construction of this building. Other farm groups and many individual farmers contributed liberally. In 1923 the State Grange authorized the raising of a fund from the 975 subordinate granges of the State to help build a dormitory for women at the College, to "commemorate the ideals and purposes of the Patrons of Husbandry," especially the recognition given to women in the Order.[53] In August, 1929, the Grange Memorial Dormitory was dedicated; it was announced that $100,000 had been contributed by granges in practically every county. These two buildings are symbolic of the faith of the farm people of Pennsylvania in the College. Another expression is the large representation of county agricultural organizations, each year, at meetings to elect trustees.

Throughout the history of the institution various types of instruction in agriculture other than in degree curricula have been given on the campus. The first was in 1869, when it was announced, "During the Annual Harvest Home of the last four days of the Spring Term (the last week in July) the College will be open to its friends from a distance and such entertainment in the way of boarding and lodging as can be given will be at their service without charge. The four days will be devoted to trials of agricultural implements and lectures by the faculty."[54] This event was continued for several years. In 1882 a "Farmers' Institute" was held at the College January 10-27; this resembled the Short Courses of later years. There were about twenty-five farmers present, only two of whom came from distant points in the State. Table board cost two dollars a week in the College Boarding Club, and rooms were three dollars for the twelve days. This experiment was discontinued as unsuccessful in 1885.

The first midwinter Farmers' Week was in 1906; there were 185 farmers present. Alva Agee, who had become well acquainted with Pennsylvania agriculture as a Farmers' Institute lecturer, was in charge. Farmers' Week was a very successful annual event for several years. In 1914 more than 1,000 farmers, representing sixty-two counties, were in attendance. After 1918 the midwinter Farmers' Week was replaced by a midsummer Farmers' Day, when the experimental work might be inspected to better advantage. Beginning in 1928 the annual Young Farmers' Week became an important feature of instruction; from 1,000 to 3,000 farm boys and girls enrolled in Four-H and Future Farmers of America clubs—the farmers of tomorrow—spent several days on the campus, inspecting the experiments and participating in judging contests.

Winter Short Courses were a major feature of agricultural instruction long before enrollment in degree curricula was significant. In 1890 a six-weeks Short Course in Dairy Manufacturing and another in Dairy Production were offered for the first time. These were so successful that in 1892 a Short Course in General Agriculture was added. In 1914 enrollment in this course reached its peak—176 from fifty-two counties. After 1918, when vocational high schools began to serve farm youth along somewhat similar lines, enrollment in Winter Short Courses declined except in the Dairy Manufacturing Short Course, which has remained an outstanding feature of instruction.

By 1940 the scope of the institution once known as The Farmers' High School and later as The Agricultural College of Pennsylvania had broadened greatly; it was a State University in function if not in name. Its original objective, however, to serve agriculture and industry, still was paramount.

THE BEGINNINGS OF AGRICULTURAL RESEARCH

Not until 1841, when the American edition of Liebig's *Chemistry and Its Application to Agriculture* appeared, followed in 1842 by his *Animal Chemistry*, was there much interest in agricultural research in America. The first centers of interest in Pennsylvania were the American Philosophical Society and the Philadelphia Society for Promoting Agriculture. In 1785 the latter group sought to establish an agricultural experimental farm, but the necessary private funds were not forthcoming. In 1794 and again in 1820 it urged the General Assembly to "establish Pattern Farms in different parts of the state" to be used for experiments in agriculture. The Legislature was not responsive. Several members of the Society, particularly John Beale Bordley, James Logan, William Logan, and Richard Peters, made noteworthy contributions to agricultural research before 1840. In 1854 the State Agricultural Society considered a proposal to invest part of its funds "in the purchase of a large farm, and to establish a school there at which scientific and practical agriculture will be fully taught."[55]

When the Farmers' High School was organized, it was contemplated that one of its major functions, supplementing instruction, would be experimentation. In a memorial to the General Assembly in 1857 requesting an appropriation for research, it was stated, "Experiments . . . are generally too troublesome and expensive to be often tried or fully tested by the individual farmer. At this School . . . experiments can be made with great facility and certainty, and at a comparatively trifling cost, and the results be made known to all the citizens of the Commonwealth without charge."[56] An Act of General Assembly passed May 20, 1857, provided that an office be established at the Farmers' High School "for the analysis of samples of soils, fertilizers and manures sent in by citizens and that reports of experiments with soils, crops and livestock be sent monthly, or as soon as available, to at least one newspaper in each county." The first President, Evan Pugh, and his pupils made important research contributions, especially on the composition and effective use of commercial fertilizers.

In 1857 William G. Waring of Tyrone, first Superintendent of the institution, and Hugh N. McAllister of Bellefonte, a trustee, established some experiments on the School farm. These were mainly variety tests, crop rotations, and tests of farm implements. One hundred and ten varieties of wheat were grown that year. The results of this early experimental work were published in the reports of the State Agricultural Society and in the public press.

Under the Act of General Assembly of February 19, 1867, the College was obligated to purchase and operate three farms for experimental purposes. The law required that they be "established and conducted as Model Farms . . . to serve as examples in successful and practical agriculture; and also as Experimental Farms."[57] This was not a new idea; in 1860 it had been proposed that Model Farms be established "by the associated efforts of County Agricultural Societies throughout the state and especially in the vicinity of every large city. . . . A convention of delegates has been called from the Societies of the five southeastern counties and a bill for the incorporation of the Model Farm Association of Pennsylvania has received the approval of the Legislature and the Governor and has become law."[58] It was planned that these farms be used to "conduct experiments and to give instruction to a limited number of students." None was established.

Under the Act of 1867, the Central Experimental Farm, located at the College, was purchased May 25, 1868. The Eastern Experimental

Farm, located at West Grove, Chester County, was purchased February 12, 1868. The Western Experimental Farm, located at Indiana, Indiana County, was purchased September 1, 1869. Hoping to secure the cooperation of farmers, the administration of the Eastern and Western farms was entrusted to committees of farmers elected by county agricultural societies in the respective districts that they were established to serve. The Central Experimental Farm was in charge of the Professor of Agriculture at the College, who also had a general supervisory relationship to the other two farms. In 1868 and 1869 Thomas H. Burrowes, President of the College and Professor of Agriculture, William C. Patterson, Superintendent of the College farm, and John Hamilton, later Professor of Agriculture, laid out experiments on each of the three farms. These were mostly variety tests, crop rotations, fertilizer tests, and a comparison of different cultural methods. There were no laboratory checks.

The Eastern and Western Experimental Farms were a dismal failure. Limited finances made it impossible to secure qualified men to conduct the experiments, and there were frequent changes in personnel. Supervision by the College was merely nominal. The name, "Model Farm," was a great handicap; they were far from being such—no experiment farm could be. For a few years farmers were hopeful that something useful might come from the venture. In 1871 *Practical Farmer* reported that at the Eastern Experimental Farm, "Seventy-five varieties of wheat are under cultivation. . . . One hundred and fifty varieties of potatoes have been planted. . . . [The farm] is under the management of some of our best practical farmers."[59]

Disillusion and dissension soon followed. The Chester County Agricultural Society stated, "[In 1872] the society and its friends subscribed several thousand dollars towards stocking the [Experimental] farm and putting it in running order, giving it, through their committees of experienced farmers, the advice and support that it needed. The society, finding its advice unheeded, and all authority over its management ignored, and seeing that for want of judgment, skill, or integrity on the part of those in control, that the farm must soon turn out a disgraceful failure, in 1876 washed their hands of it, and passed a resolution asking the Legislature to withhold the annual appropriation that was being so recklessly wasted."[60]

At the request of the State Board of Agriculture a committee from the West Grove Farmers' and Gardeners' Club and from the Concordville Farmers' and Taxpayers' Club visited the Eastern Experimental Farm in 1884. It reported that the management seemed incompetent to run the farm, even as an ordinary Chester County farm, setting aside its claims as an Experimental Farm. Out of 100 acres only two were being used for experimental purposes, for testing fertilizers.[61] The Western Experimental Farm experienced a similar loss of public confidence. In 1880 the State Grange resolved: "We regard the so-called Experimental Farms as unworthy of their name and as a reproach to the great agricultural state in which they are located." Experiments on the Western farm were discontinued in 1872; on the Eastern farm in 1887, when the General Assembly authorized the College to sell both farms. They were an ill-considered and grossly mismanaged enterprise.

Meanwhile, more fruitful investigations were being conducted on the Central Experimental Farm at the College. In 1881 William H. Jordan was appointed Professor of Agriculture and Agricultural Chemistry; he served until 1885. During his brief tenure he reorganized and systematized all the field experiments and established the world-famous soil fertility plots that now bear his name. He initiated the first fundamental research that had been conducted at the college since the time of Dr. Pugh; this included studies of the value of nitrogenous feeds in fattening steers, methods of ensilaging corn, and the effect of soil fertility and stage of maturity when cut on the feeding value of grass. He was first to apply the check of chemical analyses and laboratory studies to the results of field and feed lot experiments. In 1884 he was appointed Chemist to the State Board of Agriculture.

The College began publication of agricultural research bulletins in 1884. Fifteen were issued before 1887, when the Agricultural Experiment Station was established and a new series begun.[62] A "Program of the Principal Experiments in Progress at The Pennsylvania State College Central Experimental Farm" issued in 1886 lists:

1. The General Fertilizer Series (Jordan Plots).
2. Experiments with different forms of phosphoric acid.
3. "Field experiments," mainly tests of varieties of grains and forage crops.
4. "Stable experiments," mainly on the nutrition of steers and dairy cows.
5. "Laboratory experiments," mainly chemical analyses of fertilizers, manures, limestones, and forage crops.

THE AGRICULTURAL EXPERIMENT STATION

The first publicly supported agricultural experiment station in America was established by the Connecticut legislature in 1877; those of Massachusetts, New York, and New Jersey were established soon after. A similar movement in Pennsylvania at about the same time made some headway but failed to come to fruition. At that time the State Board of Agriculture, State Agricultural Society, and State Dairymen's Association were accustomed to appoint committees to make simple tests. The State Dairymen's Association was most active in promoting the establishment of an Experiment Station. Its interest in this subject was stimulated by addresses before its annual meetings by E. L. Sturtevant, Director of the New York State Agricultural Experiment Station, and I. P. Roberts, Dean of Agriculture at Cornell University. William H. Jordan, who came to The Pennsylvania State College in 1881, also was active in the movement.[63]

In 1883 the State Dairymen's Association resolved: "Whereas, [this Association] had under consideration the advisability of the State establishing an 'experiment station' in this State, for the benefit of the agricultural interests of the state: Therefore, *Resolved,* That we do request our representatives in the Senate and Legislature to use their best efforts to secure the passage of a law which will result in the establishment of an experiment station in this State, similar to the experimental station established by the State of New York, . . . at Geneva."[64] The Pennsylvania State College issued a circular in support of this request. Responding to this appeal, in 1883 the General Assembly passed an Act establishing an Agricultural Experiment Station at The Pennsylvania State College. It was vetoed, in biting language critical of the College, by Governor Robert E. Pattison.[65]

Unsatisfactory conditions in the administration of the College prior to the appointment of George W. Atherton as President in 1883, together with the failure of the Experimental Farms, led most farm leaders to the belief that if an Experiment Station was established it should be separate from the College. At the 1884 meeting of the State Horticultural Association the question, "Should our State establish an Experiment Station for experiments in agriculture and horticulture?" was hotly debated; fully as many disapproved of the proposal as favored it. In 1885 the State Dairymen's Association memorialized the General Assembly again on this measure and expressed the opinion, "It is believed that the usefulness of an agricultural experiment station will be greatly enhanced by locating it at some point more accessible than the State College, and as an independent institution."[66]

The issue was resolved in 1887 when Congress passed the Hatch Act. Under it the federal government established an Agricultural Experiment Station in each state and territory that accepted the provisions of the Act, and appropriated $15,000 a year to each. The Act was approved by President Grover Cleveland on March 2, 1887. It was the result of long-continued agitation by proponents of agricultural research in the land-grant colleges and in the Grange. Marked impetus was given to the movement by Frederick Watts of Carlisle, first President of the Board of Trustees of the Farmers' High School, later United States Commissioner of Agriculture. On February 15, 1872, he called a meeting at Washington of delegates from land-grant colleges, state boards of agriculture, and state agricultural societies. One of the major objectives of the meeting was to promote the establishment of agricultural experiment stations.[67] John Hamilton of Centre County represented Pennsylvania at this convention which helped to focus public attention on the need.

On June 3, 1887, the General Assembly accepted the provisions of the Hatch Act, designated that the Experiment Station be located at The Pennsylvania State College, and appropriated $12,000 to supplement the federal grant; this sum, together with $3,000 of the Hatch Fund, was used to erect the Experiment Station Building, which was completed April 1, 1889. The trustees of the College established the Experiment Station on June 30, 1887. This marked the beginning of the more general application of science to the technical problems of agriculture by the farmers of Pennsylvania.

The first staff of the Experiment Station was a small but noteworthy group. It consisted of Henry P. Armby, Director; William Frear, Vice-Director and Chemist; W. A. Buckhout, Botanist; George C. Butz, Horticulturist; H. J. Patterson, Assistant Chemist; and William C. Patterson, Superintendent of the College Farm. These six were the intellectual founders of the Experiment Station. They nurtured it during the difficult years of its infancy, when it had practically no financial support from the State and but little moral support from the industry that it was established to serve.

It was fortunate that the first Director was a man of broad scientific training who stressed fundamental research. In his first annual report he stated, "The Station proposes to undertake, in the interest of the farmers of the State . . . experiments designed either to add to our knowledge of the principles involved in the successful production of crops and animals or to show the best methods of applying in practice principles already established."[68] He deprecated the use of research funds to meet the numerous and insistent requests for empirical tests and determinations. As a matter of expediency, however, it was necessary for the Experiment Station to devote a considerable proportion of its meager resources to variety tests, analyses of miscellaneous samples, identification of insect pests and plant diseases, and to answering numerous inquiries from farmers. There was no Agricultural Extension Service then; the Experiment Station was expected to perform that function in addition to research. Much of the time of the staff was devoted to making routine analyses and determinations for the Pennsylvania Department of Agriculture.

The early bulletins were of high quality for the time. Unlike those of many similar institutions, they were not merely information leaflets but reported the result of sound research, much of it fundamental. The investigations of Dr. Armsby and his associates on the principles of animal nutrition led to the development of the Armsby feeding standards which were widely and profitably used by farmers in this and other states. Construction of the world-famous respiration calorimeter for determining the net energy value of different livestock feeds was begun in 1898 in cooperation with the United States Department of Agriculture; it was first used in 1901.[69] The present pure seed law of Pennsylvania traces back to the investigations of George C. Butz reported in Bulletin 4, "Seed Germination," published in 1888.

The first field experiments away from the College were on the fertilization of tobacco; these were begun in 1892 in Lancaster County. Gradually the work of the Experiment Station began to commend itself to farmers. In 1894 the State Board of Agriculture made this statement: "We regard the work of the Agricultural Experiment Stations and that of the Pennsylvania station in particular as of very great economic and practical value to the farmers of the state."

In spite of this evidence of its usefulness, the Experiment Station received practically no direct financial aid from the State. In 1896 it was noted, "There has been no direct appropriation by the State for the current work of the Station. Its income is derived entirely from the United States fund (Hatch Fund), what it earns in fees for the analysis of fertilizers and foods, and the sales from the Station farm."[70] The State Legislature, however, made three special appropriations in 1887 for the erection of the Station building, $12,000; in 1889 for the enlargement of farm buildings, $7,000; and in 1893 for cooperative tobacco investigations not located at the College, $4,000. For the fiscal year 1903-1904 the total income was $35,000, derived from these sources:

United States Hatch Fund	$15,000
Fertilizer, food, and feed analyses	15,000
Farm sales	4,000
Cooperative tobacco experiments	1,000
	$35,000

Prior to 1900, several investigations were made possible by the financial cooperation of Pennsylvania Department of Agriculture. After 1912 analyses for that Department were discontinued gradually; they ceased in 1922.

The first State appropriation, other than for cooperative tobacco investigations, was in 1905. Said Dr. Armsby, "The matter was actively taken up by the Allied Agricultural Organizations and an appropriation of $10,000 for two years for the general maintenance of the Station, together with $2,500 for the erection of an implement shed and poultry house, was finally secured."[71] On March 16, 1906, the federal Adams Act became law. This provided an additional federal fund of $15,000 a year to be used primarily for fundamental research.

After 1906 the Experiment Station made rapid progress in public esteem and in State support. Farmers began to realize its potential value to their industry. Among the first farm enterprises to benefit largely from its investigations were the livestock and fruit growing industries. The research by Dr. Armsby on the principles of animal nutrition and the feeding standards resulting therefrom revolutionized current farm practice. The results of experiments by T. I. Mairs and W. H. Tomhave on the use of silage in fattening steers found wide acceptance. Fruit growers were aided in the control of insect pests and plant diseases. These and other evidences of the practical applications of agricultural research eventually won for the Experiment Station the support of its agricultural constituency. This support has strengthened with the years.

In 1907 Dr. Armsby retired as Director in order to devote all his time to research in the Institute of Animal Nutrition. The contributions of this agency brought world-wide distinction to him and to the College. His death, in 1921, removed the most outstanding figure in the early history of agricultural research in Pennsylvania. The appointment of Thomas F. Hunt as Dean and Director in 1907 was coincident with a marked upswing in agricultural prosperity and in the interest of Pennsylvania farmers in agricultural research. The next six years witnessed a remarkable expansion of the physical plant and personnel. In 1907 the staff numbered twenty; in 1912, sixty-three. The mailing list for Experiment Station bulletins increased from 8,000 in 1890 to 42,000 in 1910.

Financial support from the State continued to be limited. There was no further direct State appropriation until 1923 other than recurring small amounts for cooperative tobacco investigations; these began in 1893 and terminated in 1927 when they were merged with the general appropriation to the College. In 1923 the General Assembly ear-marked $50,000 of the College appropriation for the biennium for agricultural research. This action resulted in large part from a Farmers' Research Conference, sponsored by the Pennsylvania State Chamber of Commerce, held at the College on May 25-26, 1922. By 1929 this appropriation had increased to $300,000, mainly through the efforts of the State Council of Farm Organizations. In 1931 this special fund was merged with the general appropriation to the College; after that there were no ear-marked State funds for agricultural research, but part of the general appropriation to the College was budgeted for this purpose. Meanwhile there was a marked increase in federal appropriations, from the Adams Fund (1906), Purnell Fund (1925), and Bankhead-Jones Fund (1935). In 1937, out of a total annual budget of $324,000 about half or $157,000, was from federal funds.

By 1940 the Agricultural Experiment Station was firmly established in the confidence of farmers. Its investigations no longer were localized at the college but were State-wide. This was achieved, not by establishing permanent sub-stations in different parts of the State, but by conducting applied research wherever the problem arose. Before the Purnell Fund became available, in 1925, most of the investigations were on problems of production; thereafter, research on the economic and social problems of agriculture, especially on the marketing of farm products and means of promoting a satisfying rural life, was prominent in the program. The Northeastern Regional Pasture Research Laboratory, established at the College in 1935 by the federal government, strengthened research in this important field.

The half century from 1887 to 1937 witnessed an expansion in the facilities and service of the Agricultural Experiment Station that would have been considered impossible of achievement by its founders. The Staff increased from six to 148; the number of research projects from eight to 131; the annual budget from $20,000 to $324,000; and in 1940 to $567,000. The little frame Experiment Station Building dedicated so proudly in 1889 was overshadowed by great laboratories. Every year many thousands of farmers and their sons came to the College to view the results of the experiments; many more thousands read the published results or profited by the program of the Agricultural Extension Service which carried them into farm practice. On the occasion of the Fiftieth Anniversary of the founding of the Experiment Station, October 12, 1937, several hundred farm leaders came to the College to evidence the continuing interest and support of its agricultural constituency.

AGRICULTURAL EXTENSION, 1892-1914

Organized instruction in agriculture away from the campus was begun in 1892 with the establishment of the Correspondence Courses in Agriculture. The Farmers' Institutes conducted by the State Board of Agriculture and later by the Pennsylvania Department of Agriculture were a forerunner of Agricultural Extension. The popularity of the Chautauqua Movement, which was founded in 1874 on Chautauqua Lake, New York, led the College to begin The Chatauqua Course of Home Reading in Agriculture, under the direction of George C. Watson. At first the College supplied textbooks and gave examinations on them by correspondence. In 1897 the difficulty in securing suitable textbooks led to the substitution of a series of short printed lessons prepared by the staff, but textbooks still were used in some courses. In 1897 the name was changed to Correspondence Courses in Agriculture. After 1905 the courses were given almost wholly by means of printed lessons, and books were used only for supplemental reading.

The Correspondence Courses were an immediate success. On March 1, 1899, the enrollment was 3,416, representing most states and several foreign countries. The age of the students ranged from seventeen to seventy-five, averaging thirty-three years. In 1907, thirty-nine courses were offered. Professor Watson commented, "Through no other channel has the Department of Agriculture been able to keep in so close touch with the farmers of Pennsylvania. . . . The old students are continually looking to the College for help or assistance along new lines."[72] In 1940 the Correspondence Courses, greatly expanded, still were serving a large number of farmers in this and other states. They had become more personalized through frequent correspondence.

The Department of Agricultural Extension was organized in 1907, with Alva Agee in charge; he served until 1912, when Milton S. McDowell, who served for thirty years, succeeded him. In the early years of the Department the extension program included addresses at Farmers' Institutes and other meetings, educational exhibits at fairs, press releases, correspondence courses, counseling with farmers by letter or by visits to farms, railroad agricultural instruction trains, boys' and girls' corn clubs, Farmers' Week at the College, railroad excursions of farmers to the College, promoting the teaching of agriculture in the public schools, and cooperative farm tests with former students of the College. For a number of years the Department of Agricultural Extension had charge of the Winter Short Courses. At that time Boys' Corn Clubs were very popular. In 1908 W. T. Phillipy of Cumberland County was in charge of a club of 120 boys; at the close of the season each boy submitted an account of the methods of culture practiced and exhibited his product at a corn show.[73]

The first agricultural instruction train in this State was made available by the Pennsylvania Railroad in 1908. It made brief stops at many stations; members of the college staff and others addressed audiences seated in the cars. "The Pennsylvania Railroad," said Pennsylvania Department of Agriculture in 1910, "in the past four years has been conducting an active campaign in the interest of scientific farming. Much instructive literature has been disseminated . . ., while farmers' special educational trains have been operated on various divisions from time to time. In this work the railroad company is co-operating with the State Agricultural Department and the State College of Agriculture."[74] The Cumberland Valley, Reading, and other railroads ran similar trains. In 1913 the Lehigh Valley Railroad ran a train for instruction and demonstration on farm home sanitation; 6,500 people came to it.

Farm demonstration work began in 1904, when the United States Department of Agriculture organized the Farmers' Cooperative Demonstration Work in Texas, primarily to control cotton boll weevil. Soon it was operating in all the southern states. In 1912 Congress made an appropriation to extend this program to parts of the northern states on a county basis. In November, 1912, the work was begun in five counties in Pennsylvania—Montgomery, Blair, Washington, Mercer, and Butler. It was under the direction of the Office of Farm Management, U. S. D. A., and the Department of Agricultural Extension of the College, jointly. The federal department paid half the expense, and the counties half.

For several years previous, however, one county in Pennsylvania had opportunity to appraise the value of this service. In 1907 A. B. Ross, a young lawyer of Cleveland, Ohio, was forced by ill health to return to his boyhood home in Bedford County. He devoted much time to riding around the county with horse and buggy, talking with farmers, distributing published information on agriculture, mostly U. S. D. A. bulletins, securing superior seed corn, and making tests of inoculation for legumes. On March 1, 1910, he was employed by the U. S. D. A. to continue and expand this program; thereafter he traveled by automobile

In 1912 Agricultural Extension workers were employed to serve the five counties mentioned; in 1913, Lancaster, Bedford, and Bradford counties were added.[75] By 1914, when the Smith-Lever Extension Bill became effective, eleven counties were served by Extension workers.[76] In 1913 the General Assembly made an appropriation of $20,000 for extension work in agriculture and home economics. The preamble to the Act recited, "In order to bring directly to the farmers of Pennsylvania the results of the thirty-one years of experiments conducted by the Agricultural Experiment Station . . the trustees of the Pennsylvania State College may employ and maintain resident county advisers and traveling experts in farm management."[77]

At first these men were variously called County Agricultural Experts, County Agricultural Counsellors, or Farm Experts; later, County Agents or Extension Representatives. In 1913 the General Assembly authorized county commissioners to appropriate funds for Extension work; this was done in all of the twelve counties except Bedford and Lancaster. The customary appropriation was $1,000 a year. In some counties local organizations and individuals contributed $300 to $1,700 a year. All counties except Bedford had a local organization, called a Farm Bureau, to cooperate with Extension Representatives. Membership in the Farm Bureau was not limited to farmers; in 1914 the Pennsylvania Railroad contributed $900 for Extension work in Bradford County. In 1914 the twelve Extension Representatives visited 4,100 farmers and organized twenty-six corn clubs.[78]

AGRICULTURAL EXTENSION, 1914-1940

The Smith-Lever Agricultural Extension Act was approved by President Woodrow Wilson, May 8, 1914. John Hamilton of Centre County was influential in its behalf. It had powerful support from the National Grange and the American Federation of Labor. The nature of the proposed service was defined in the Act: "It shall consist of the giving of instruction and practical demonstrations in agriculture and home economics to persons not attending or resident in said colleges . . . through field demonstrations, publications and otherwise." The General Assembly quickly assented to the provisions of the Act and designated The Pennsylvania State College as the institution to administer it.

The federal funds made available were $10,000 annually to each state and additional funds in proportion to the rural population of the state, provided the latter sum was offset by an equal amount derived from sources within the state. Pennsylvania, which has a large rural population because of its numerous small industrial towns of under 2,500 population, was entitled to receive a larger amount than any other state. The contributions of county or local governments, organizations, or individuals, as well as state appropriations, could be used to offset federal funds. The law went into effect July 1, 1914. In 1939 the Smith-Lever fund amounted to $239,000; the total Extension budget was about $1,000,000 a year and the staff numbered 200.

Pennsylvania farmers responded enthusiastically to the Smith-Lever Act. In 1915, one year after the law went into effect, twenty-two counties had Farm Bureaus and five others were organized but had no County Agent. The first Agricultural Extension representative in Home Economics was assigned to Mercer County in 1915. By 1924 all of the sixty-seven counties except Fulton had County Agents. Pennsylvania is noted for the long tenure of its extension representatives. On February 17, 1938, the farmers of Lancaster County observed the completion of a quarter century of service in that county by Floyd S. Bucher. Other counties have had similar occasions.

There were, however, some dissenting voices. At its meeting on January 26, 1915, the State Board of Agriculture adopted this resolution: "We are opposed to the acceptance of [this federal money by the State] unless the total sum of the Federal and State appropriations for extension work be distributed equally by and through the State Department of Agriculture and the Pennsylvania State College."[79] A few farmers based their objection on the principle involved; they contended, "The appropriation of money for such a purpose is class legislation. Farmers are not entitled to such assistance any more than any other class."

In the early years of Agricultural Extension, county organizations of farmers that guided and often helped to support the work were known as Farm Bureaus. In only a few cases were these on a paid-membership basis, as was common practice in mid-western states. The relationship between the Farm Bureau and the County Agent became a matter of concern. There was some disposition for the Farm Bureau to regard the County Agent as its "hired man" who was obligated to perform any type of service that it might require, including the management of cooperative purchasing of farm supplies or marketing of farm products. In 1918 County Agents were directed by the States Relations Service of the U. S. D. A. to confine their activities to educational work.

The American Farm Bureau Federation was organized in 1919, representing mainly the midwestern states. Its announced objectives were not only to support the Farm Bureau (Extension) program but also to formulate national policies for agriculture through legislation and to engage in cooperative buying and selling. It was anticipated that county Farm Bureaus would do likewise and that the County Agent would actively engage in cooperative buying and selling. The Pennsylvania State Grange saw the danger inherent in this policy. In 1921 it opposed the organization of Farm Bureaus on a paid membership basis and demanded that the Extension program be made available to all farmers, as a public service. It feared that if a Farm Bureau were organized on a paid membership basis the County Agent might be tempted to give first, if not exclusive, attention to those farmers who helped support the program with their annual dues. The main issues, however, were whether the County Agent was to be a business man as well as an educator; and whether a farm organization that was built on a public agency should represent farmers.

This issue was joined when the Pennsylvania Farm Bureau Federation was organized on November 18, 1922, by representatives of seven county Farm Bureaus having 3,000 paid members. In all counties the salaries of Agricultural Extension representatives were paid from federal and State funds. Other expenses were met mostly by the appropriation of county funds by county commissioners; very little by private subscription. Few County Agents had undertaken work that was not strictly educational and could not properly be paid for from public funds; hence there was little incentive to organize Farm Bureaus on a paid membership basis, except to engage in cooperative buying and selling.

In August, 1922, the Director of Agricultural Extension, Milton S. McDowell, ruled that the Extension program in any county could not be sponsored by a Farm Bureau exclusively; that Agricultural Extension, which is supported with public funds, must serve all people and all organizations alike; that its sole function is education; and that it was necessary to organize in each county "a County Extension Association whose sole business would be to assist the United States Department of Agriculture and the college with the extension activities. . . . County appropriations would be made to and expended by it. . . . The Farm Bureaus as an organization would conduct activities outside of the sphere of Extension."[80] This policy was put into effect. Its prompt adoption avoided the sharp reaction against Agricultural Extension that occurred in states where County Agents engaged directly in cooperative buying and selling. Pennsylvania was the only state in which Agricultural Extension was fully separated from the Farm Bureau. In most Pennsylvania counties the Farm Bureau was discontinued after the Agricultural Extension Association was organized; in some it was continued as a private cooperative. In 1925 the Lancaster County Farm Bureau had 1,500 members, who paid annual dues of five dollars.

In 1922 Henry Wallace, United States Secretary of Agriculture, thus defined the function of Agricultural and Home Economics Extension: "These workers are public teachers. Their work covers the entire rural field—economic production, economic marketing, the development of better rural homes, and better rural community social conditions." No other public agency has come so close to the heart of rural Pennsylvania. This is largely because the county program has been developed, each year, by the farmers themselves and is an expression of their interests and needs. After 1920 the county program was developed on a community basis; each year community planning conferences were held attended by local farmers, the County Agent, and several subject-matter Extension Specialists from the College. The sum of the community programs agreed upon at these meetings became the county program. The annual meeting of the County Agricultural Extension Association received reports of progress and approved the county program for the ensuing year.

The County Agent worked primarily with farmers and farm youth; the Home Economics representative, with village and rural non-farm families as well as with farm families. One or more Extension Specialists in each of the varied fields of agriculture and home economics worked with and through the county extension representatives. By 1940 all counties except Fulton had at least one full-time farm agent, and all but two had at least one full-time home demonstration agent.

The wide range of the Extension program, even as early as 1920, is revealed in a partial list of activities encouraged by County Agents for that year: boys' and girls' clubs; crop, fertilizer, and spraying demonstrations; variety demonstrations; community cow testing associations; community purebred bull associations; cooperative wool marketing; farm accounting; cost of production records; installation of septic tanks and tile drains; farm woodlot management; reforestation; poultry culling; assistance to cooperative groups; family nutrition and clothing. By 1940 Extension activities were much more numerous and more varied. The Extension representatives participated in daily or weekly radio programs, giving timely suggestions on farm and home activities. In 1922 the County Agent of Adams County was first to use the airplane to ascertain quickly the progress of the wheat harvest in the county. In 1939 Extension representatives in agriculture and home economics conducted 7,600 farm and home demonstrations, organized 1,900 automobile tours to inspect farms, and held 19,000 educational meetings attended by over half a million farm people.

From the beginning, Extension activities with youth have rivalled those with adults. After 1914 rural boys and girls were organized into Four-H Clubs (Head, Heart, Hand, Health). Most of the members were from ten to fourteen years of age, but some were eighteen. Four-H Club members carried out home projects in different fields of agriculture and home making, as baby beef, pig feeding, ton litter, sheep, rearing the dairy calf, milk testing, poultry hatching and rearing, potato production, corn production, home gardening, market gardening, strawberry raising, the farm woodlot, farm accounting, cooking, sewing, canning, home equipment and decoration. Club members were counseled by Extension representatives, often at visits to their homes. In 1940 there were 675 boys' clubs with 6,000 members, and 906 girls' clubs with 15,000 members.

The Four-H Club program was varied with automobile tours, camping, judging contests, public demonstrations, and competitive or educational exhibits at fairs. Many county bankers' associations, service clubs, and other local business groups cooperated in Four-H Club work by providing funds. In 1926 the Rotary Clubs of Doylestown and Quakertown, Bucks County, sponsored forty boys and girls enrolled in the county pig club. Each of the Club members was supplied with two pigs for which he signed a note endorsed by a Rotarian. The Agricultural Committee of the State Bankers' Association was particularly helpful in this respect. In 1928 it appointed "key bankers" in every county to assist both adult and youthful farmers in their Extension activities, especially in securing purebred livestock.

Social features of Four-H Clubs included tours, camping, and the annual Four-H Club Week at The Pennsylvania State College. The first boys' camp was in Chester County in 1915, when twenty-four members of Boys' Corn Clubs in the county spent a week in camp. The first Four-H club camp was in Lawrence County in 1922. In 1940 there were thirteen district Four-H camps; more than a thousand boys and girls were in camp for four days of training and recreation. The program reached into practically every rural community and was a vital force for the betterment of rural life. Often Four-H Club work has been a means of interesting fathers in adopting better farm practices. Many former Four-H Club members became leaders in their communities.

Training farm youth for leadership in rural life has been a major objective of Agricultural Extension. In 1939 more than 1,500 young men and young women eighteen to twenty-five years old were members of Senior Extension Clubs, in thirty counties. About half were former Four-H Club members. This group met at The Pennsylvania

State College for one week each summer for training in agriculture, home economics, civic improvement, and citizenship.

The first test of the usefulness of the Extension program in helping to meet a national emergency was during World War I, in 1917-1918. It aided the federal Treasury Department in Liberty Bond campaigns, the Labor Department in mobilizing farm labor, and the Federal and State Councils of Defense and Red Cross in their war-time programs. When the National Food Administration was established, on August 10, 1917, the federal government appealed for greatly increased production of food, especially cereals and meats. Special appropriations from Congress made it possible to appoint additional farm and home demonstration agents and specialists. The Extension Service assisted farmers to secure seed, labor, fertilizer, livestock, and machinery. It stimulated the planting of community and home vegetable gardens and the preservation and conservation of food. The greatly-increased food production of the State during this critical period was due, in large measure, to the resourcefulness of the Extension staff. Its demonstrated usefulness during the war solidified farmer and public support of the program. This support has strengthened with the years.

AGRICULTURE IN THE PUBLIC SCHOOLS

In 1847 the Senate Committee on Education of the General Assembly considered a memorial from certain citizens praying for an appropriation "to place *Farmers' Library, Monthly Journal of Agriculture* and other agricultural works in the common schools."[81] The request was not granted. In 1861 a Chester County farmer inquired, "I have been asking myself why the elements of agriculture have not been introduced as a branch of study in our public schools, and especially in those which are located in rural districts. . . . By all means let us take steps to place within reach of every farmer's son who desires it, the means of acquiring sound information upon subjects which are to engage his attention more largely than any other in after life."[82]

In 1880 the State Agricultural Society offered prizes "To the State Normal School in Pennsylvania which shall give to all its classes, during the session of 1880-81, the best course of instruction on the principles and practice of agriculture." It also provided an award "To the teacher of a graded school in Pennsylvania who shall give, during the session of 1880-81, the best instruction on the elements of agriculture and practice the pupils in the cultivation of grounds adjoining school-house."[83]

The first definitely organized instruction in agriculture in public schools was in the form of nature study and school gardening. In 1889 W. S. Jackson, a Pittsburgh teacher, took his pupils into the fields and woods to observe natural phenomena, season by season. In 1890 he published *Outlines in Elementary Science,* a series of bimonthly leaflets; these were brought together in a book in 1891. In 1889 Frank O. Payne, who had begun similar teaching at Corry in 1884, used the term "nature study" for this type of instruction. Between 1890 and 1900 a number of Pennsylvania public schools, mostly urban, had gardens. School gardens, as usually handled, were impractical; it would have been better to have encouraged the children to have gardens at home.

In 1899 The Pennsylvania State College issued ten nature-study leaflets for use in public schools, seven on animal and insect life, and three on plant life. In 1900 the Farmers' Institutes in fifty-seven counties recommended the introduction of nature study into the common school curriculum; similar action was taken at a meeting of representatives of State-wide agricultural organizations at State College that year.[84] Further impetus was given to the nature-study movement by the publication of two bulletins on the subject by the Pennsylvania Department of Agriculture.[85]

Soon after 1900 a few rural high schools began to give instruction in agriculture. The first such school in Pennsylvania, and one of the first in the nation was that at Waterford, Erie County. In 1904 it was reported, "Prof. H. O. Sampson . . . is a graduate from the Iowa Agricultural College and has been called by the Erie county people to introduce the study of agriculture into their rural high school. This so far as I know is the pioneer attempt to introduce the study of agri-

First Agricultural High School in Pennsylvania, at Waterford culture into the public rural schools of Pennsylvania."[86] Instruction in the Waterford school began in October, 1904. About fifty of the eighty pupils enrolled in agriculture were from farms. Class work was supplemented by laboratory practice and by visits to outstanding farms in the neighborhood. The course was five hours a week for four years. There was a small library of agricultural books, bulletins, and reports. It was stated, "Every good farm within a radius of 3 or 4 miles . . . and the farm implement stores furnish costly illustrative material and extend vastly the teaching force of the high school. The farmers and other owners of good stock either bring their animals to the door of the school house to be studied by the class in agriculture or allow the class to go to their barns and fields for this purpose."[87]

The introduction of agriculture into the public schools depended largely on the attitude of the County Superintendent. In 1909 it was taught in eighty-one schools in York County.[88] In 1912 the Superintendent of Schools of Berks County reported, "We have had corn-raising contests, poultry-raising contests and other such contests in Berks County, for both boys and girls, for the last seven years." In 1908 The Pennsylvania State College published a syllabus on agriculture for use in the public schools, and several of its faculty gave instruction to high school teachers interested in this subject who were enrolled in Summer Schools.[89] By 1910, "of about 900 High Schools in the State, 155 teach some agriculture."[90] Most of them were schools of the third class, and the instruction was elementary rather than of high school grade.

The School Code of May 18, 1911, required that agriculture be taught in all township high schools.[91] Part of the State aid could be used "to promote education in conservation, forestry and agriculture." Lindley H. Dennis was appointed to the staff of the Department of Public Instruction to stimulate and supervise the program. The Vocational School Act of May 1, 1913, provided for the organization of departments of Agriculture in high schools and for the establishment of vocational agricultural high schools which offered full four-year courses in agriculture. It was stipulated that the latter schools should employ teachers for the entire year and that they "demonstrate before their pupils during the growing season the instruction given during the months when pupils cannot be taken afield for such work."

In 1915 there were twelve vocational agricultural high schools. By 1916 most counties had one or more high schools with departments of agriculture; Mercer County had four. In some counties traveling agricultural teachers gave instruction at schools that had no department of agriculture and supervised the home projects of the pupils. In 1916 it was stated, "In these rural community vocational schools, every boy spends one-half of his time carrying on practical work, doing things instead of studying about things. The other one-half of his time he spends in the study of regular academic subjects. . . . State aid amounts to two-thirds of the salaries of all the vocational teachers employed by the school district, and the State gives from $900 per year to $3,600 per year to a school district for operating schools of this kind."[92]

The Smith-Hughes Vocational Education Act was passed by Congress February 23, 1917. This greatly strengthened public school instruction in agriculture, home economics, and trades and industries to pupils over fourteen years of age, by providing federal funds to supplement state funds for this purpose. This Act resulted from the activity of the American Federation of Labor in its behalf, as well as from the initiative of friends of vocational education in the land-grant colleges. It established a broad system of vocational education as a permanent feature of public school instruction. Provision was made for training teachers at agricultural colleges. In 1938 it was reported, "Agriculture now is being taught in 317 of the rural high schools in the state and that forty more will add such instruction next year. The present enrollment in these courses in farming is 12,500. . . . In addition . . ., 122 of these schools conduct evening classes for young farmers from the ages of 18 to 30 and the enrollment in these special classes is approximately 3,000."[93]

Fifty of the 317 high schools in which agriculture was taught in 1938 were community vocational agricultural high schools in which boys and girls were prepared specifically for farming and home making. During the first two years all vocational pupils devoted half their time to agriculture or home economics and half to academic courses. The last two years could be a continuation of this schedule or the pupil might elect to take full time academic work. Few new schools of this type were organized after 1930; experience had indicated the greater usefulness of agricultural departments in regular high schools. In 1939 there were 305 departments of vocational home making, with 16,195 pupils.

The home project was a vital feature of secondary instruction in agriculture and home making. Under the supervision of the instructor, the boys produced corn, potatoes, or other crops on a limited acreage or fattened a steer, raised a litter of pigs, cared for poultry or other livestock. Some girls did likewise or engaged in a home-making project, as canning, sewing, home decoration. Said the *Guide Post* in 1939, "Should the project produce a cash profit the boys will be allowed to bank the money. . . . [Some vocational school boys] can show bank accounts totaling up to $2,000. Annually some of these lads earn through their vocational projects anywhere from $50 to $500."[94]

In 1928 the Future Farmers of America, comprising boys enrolled in vocational school classes in agriculture, was organized. The Keystone Branch of the F. F. A. was organized at the Farm Show in January, 1930. In 1939 there were 217 local chapters in Pennsylvania, with 5,172 members. The objectives of the organization were to develop leadership and love of country life. Each chapter held educational meetings and judging contests, and engaged in various types of recreational activity, including camping. It made exhibits at the Farm Show and participated in the State-wide judging contests there. Each summer many of these young farmers attended F. F. A. Week at The Pennsylvania State College; in 1940 over 1,000 participated in judging contests and engaged in recreational activities. Winners of the judging contests entered the national F. F. A. competition.

As the number of rural high schools offering instruction in agriculture increased, the instructors came more and more into contact with County Agents. Either on their own initiative or at the request of farmers in the vicinity of these schools, some of them undertook extension work with adult farmers. This duplication of program led to confusion. On February 21, 1918, representatives of the United States Department of Agriculture and of vocational education agreed that the program of vocational school teachers should be limited to giving instruction to youth enrolled in the schools, the supervision of the home projects of these pupils, and teaching adults enrolled in a definite course of instruction at the school, as at night schools of six or more weeks duration. Any extension work with adult farmers was to be in cooperation with the County Agent. Usually this understanding has been carried out in a spirit of friendly cooperation between the two agencies.

Vocational public school instruction in agriculture has been successful in meeting its major objective—to foster a love of country life. A survey made in 1939 revealed, "Out of 20,725 boys who had 1 or more years of vocational agricultural instruction in Pennsylvania, 68 per cent were farming in one capacity or another last year."[95]

OTHER INSTRUCTION IN AGRICULTURE

From time to time attempts have been made to establish private schools of agriculture. Prior to 1850 most of these were of the Fellenburg or handicraft type. In 1842 James Pedder, associate editor of *Farmers' Cabinet*, announced that he had connected himself with Joseph Cowperthwait, Esq., for the purpose of opening an agricultural school to be known as the Eden Hill Farm Institute, on the farm of the latter, which lay on the banks of the Delaware twelve miles above Philadelphia. On this farm he proposed to instruct a limited number of young men in the principles and practice of Agriculture and Horticulture.[96] This venture was short lived; nothing was heard of it after 1845.

In 1847 James Gowen announced that he planned to establish the "Mount Airy Agricultural College" on his farm near Philadelphia. He was a man of considerable means who had, he said, "quit the bustling scenes of business and city life for the quiet and more respectable station of a farmer or, if you please, gentleman farmer." His prospectus stated the purpose, "To educate youth in the leading branches of popular learning as taught in our Colleges, with the addition of practical and theoretical Agriculture and Horticulture, with the attendant sciences. . . . Students will be admitted at ten years old and upwards. . . . The Terms will be *Two Hundred Dollars* per Annum, for Board and Tuition."[97] Being a wealthy man, he expected to make "not a dollar by the way of profit." The faculty was to "combine the best talent, both in Literature and Rural Economy." The school was to open September 1, 1847, "if eighty students shall offer."

The response from the public was not enthusiastic. In July, 1847, the founder stated, "The students offering to enter . . . fall far short of the number required . . . and I am therefore constrained to announce to the public, that the College cannot go into operation."[98] In April, 1848, however, he reported, "Mr. John Wilkinson, Principal of the Dutchess (New York) Agricultural Institute and an excellent practical farmer has proposed that I should lease to him my homestead farm and buildings. To this proposal I acceded in the hope that to the number of students Mr. Wilkinson could bring with him from the Dutchess Agricultural Institute would be added those who had previously applied for admission to the Mount Airy Agricultural College."[99] The merger was effected and the name changed to Mount Airy Agricultural Institute.

The school operated for eight years with very small enrollment. In 1849 it had "thirteen regular students besides those from the village who attend the lectures, among them one sent by the Brazilian Government." In 1853 John Wilkinson reluctantly announced, "My school will be discontinued the first of March, 1853. I have continued it eight years and have had under my tuition in that time 217 pupils. Among these but four were sons of farmers. . . . A large majority of my pupils have engaged in agriculture."[100] Some years later James Gowen admitted, "The School was a mortifying failure."

In 1851 it was reported, "The trustees [of Franklin and Marshall College] intend to found an agricultural professorship in this institution."[101] The founding of the Farmers' High School soon thereafter prevented the consummation of this plan.

The establishment of the School of Veterinary Medicine, in 1884, at The University of Pennsylvania, with a State appropriation for the erection of a building, inaugurated the long and fruitful service of that institution to Pennsylvania agriculture.

The National Farm School at Doylestown, Bucks County, was founded in 1896 by private subscription. Its primary objective was to offer training in agriculture to urban Jewish youth and thereby divert some of them from the city to the country, but enrollment was not limited to Jewish students. Instruction was of secondary grade; the four-year curriculum emphasized practice on the 122-acre farm. In 1901 it received a State appropriation of $2,500 annually; in 1905 this was increased to $7,500.

The School of Horticulture for Women at Ambler, Montgomery County, opened in 1907. It was privately supported and instruction was of secondary grade. Practice on the farm of seventy acres and frequent visits to private estates in the vicinity of Philadelphia trained women students in the production and utilization of flowers and other ornamentals, vegetables, fruits, poultry, and bees.

The Industrial and Agricultural School at Downingtown, Chester County, was established to provide elementary and secondary instruction in agriculture to colored youth. It was privately supported.

The International Correspondence School of Scranton has offered a number of courses in agriculture.

OUTSTANDING AGRICULTURAL LEADERS

After 1900 agricultural leadership was by organizations more than by individuals. During the century considered in this survey, however, several men have made contributions so outstanding as to merit special recognition.

Frederick Watts (1801-1899), of Carlisle, owned and operated a farm in Cumberland County, but most of his life was spent in public service. He was a prominent member of the bar; at one time he served as Judge. In 1839 he introduced the Mediterranean variety of wheat which enabled many farmers to avoid severe loss from Hessian fly. The first field trial of the McCormick reaper was on his farm in 1840. He was prominent in the organization of the State Agricultural Society in 1851 and served as its first President.

Judge Watts is known as "The father of The Pennsylvania State College." He was the moving spirit in its organization and served as President of its Board of Trustees during the difficult years of its infancy, from 1855 to 1874. For twenty-six years he was President of the Board of Directors of the Cumberland Valley Railroad. In 1871 he was appointed United States Commissioner of Agriculture and served six years. While in Washington he laid a broad foundation for the United States Department of Agriculture and was influential in developing public sentiment for the establishment of Agricultural Experiment Stations. Judge Watts had an inquiring mind; many fruitful experiments with crops, livestock, and machinery were conducted on his farm. From 1850 until 1880 he was by far the most outstanding figure in Pennsylvania agriculture.

Thomas Meehan (1826-1901) was one of the most prominent horticulturists of his time. In 1859 he established *Gardeners' Monthly* at Philadelphia and was its editor for thirty years; this was the most widely read horticultural journal of that period. He was nationally recognized as a foremost authority in the scientific aspects of horticulture and botany. In 1859 he was a moving spirit in the organization of the Fruit Growers' Society of Eastern Pennsylvania, now the State Horticultural Association, and he contributed to its program for thirty years. No man did more to further the development of Pennsylvania horticulture.

Leonard Pearson (1868-1909) made the first tuberculin test for bovine tuberculosis in the United States at Philadelphia in 1892. The State Livestock Sanitary Board was organized largely through his initiative. He served as State Veterinarian from 1895 until his death in 1919, and fought successfully the first outbreak of the dreaded foot-and-mouth disease in this State. Leonard Pearson laid the foundation for the effective program of disease control in dairy herds which has helped to make dairying the major agricultural enterprise of the Commonwealth.

Joseph T. Rothrock (1839-1922) has been called "The father of Pennsylvania forestry." He was the moving spirit in the organization of the Pennsylvania Forestry Association in 1866. In 1893, as Secretary of this Association, he prepared an impressive report on conditions in Pennsylvania forests; this report led to the establishment of the Division of Forestry in the Pennsylvania Department of Agriculture, now the Department of Forests and Waters. Dr. Rothrock was the first Commissioner of Forestry, and served from 1895 to 1904. During his tenure over half a million acres of denuded and fire-devastated forest land were purchased by the State. At his death, in 1922, *National Stockman and Farmer* paid him this well-deserved tribute: "Pennsylvania state forests now cover 1,126,000 acres, and every citizen is proud of them. That the state has these forests is due largely to the vision, courage and perseverance of Dr. J. T. Rothrock. He will not lack a memorial in Pennsylvania as long as trees grow for the pleasure and use of mankind."

Henry P. Armsby (1853-1921) was the first great agricultural scientist of Pennsylvania. His research at The Pennsylvania State College on the nutrition of farm animals, while Director of the Agricultural Experiment Station and later Director of the Institute of Animal Nutrition, received world-wide recognition. His *Manual of Cattle Feeding,* published in 1892, was translated into profitable farm practice. He administered the School of Agriculture during the difficult years from 1887 until 1906, before the farmers of the State had rallied to its support, and was largely instrumental in stimulating this interest.

Edward S. Bayard (1870-1952) was a major factor in the development of Pennsylvania agriculture between 1890 and 1904. As editor of *National Stockman and Farmer* from 1889 to 1925 and thereafter as editor of *Pennsylvania Farmer* (combined with *National Stockman and Farmer*), he wielded a trenchant pen. He was a man of strong convictions on agricultural policy, which he expressed fearlessly and cogently. He founded the State Livestock Breeders' Association, which for many years included the dairymen, and served it as either President or Secretary for twenty-five years. He was chiefly responsible for initiating the first State Corn Show; this developed into the State Farm Show, of which he was the moving spirit for many years. Mr. Bayard served on the Board of Trustees of The Pennsylvania State College for thirty years and gave staunch support to the developing program of the College, especially in agricultural instruction and research. For nearly fifty years the strong personality and persuasive logic of "Ed" Bayard were exerted effectively in every movement for the betterment of Pennsylvania agriculture.

XVII

Rural telephone

THE FARM HOME

DURING the century from 1840 to 1940, the farm home experienced changes fully as revolutionary as those in farm practice. Most significant of these was urbanization of rural life and the increased number of non-farm families that live in the country. The isolation that had characterized country homes was removed by good roads, automobile, telephone, radio, rural free delivery of mail, and parcels post. The marked difference that hitherto had existed between rural and urban homes largely disappeared; by 1940 many farm homes were fully as attractive, comfortable, and abounding in household conveniences as urban homes. As they mingled more and more freely with their neighbors in towns and cities, farmers found ever-widening opportunities for education and public contact opened to them and their families. They were no longer a class set apart; they became citizens of the world.

THE FARMHOUSE

During the period of agricultural prosperity from 1860 to 1873, more substantial and more beautiful farm homes were built than at any other time in the history of the State. They were commonly of brick, red sandstone, or blue-gray limestone. The gray-schist farm homes of Chester Valley, with white outbuildings and fences, were a fitting expression of a fat land and a prosperous agriculture. Most of these homes were built by the farmers themselves from their own plans, sometimes with the aid of local craftsmen.

In remote rural districts, especially on the more fertile soils, frame houses began to supersede log houses and cabins soon after 1840. In 1850 an attractive six-room farmhouse with some architectural pretentions could be built for $1,500. In many cases log houses still sound were sheathed with siding.

Until late in the nineteenth century, it was commonly observed, especially in counties where farmers of German descent predominated, that the barn was more spacious and imposing than the house. It was the judgment of these thrifty farmers that buildings which contributed to income rather than to living comfort should have first consideration. In 1840 *Farmers' Cabinet* commented, "We see everywhere abounding noble farms in neat and beautiful order . . . all evincing an advanced state of agriculture, as well as a fertile soil. . . .[The farmhouses are] too frequently . . . dilapidated, neglected, slovenly [in] appearance, . . . devoid of taste and beauty, and without . . . domestic comforts. . . . [But] our *barns* are objects of pride."[1] Most of these farmers hoped to build comfortable homes when their economic condition justified it. Some of the frame structures built in later years, while better lighted and more efficient functionally, were distinctly inferior in attractiveness to those built between 1860 and 1873.

The farm-home ideal of 1840 included a combination kitchen, dining-room, and living-room, at least half a bedroom for each member of the family, and a parlor. Most of the time the parlor was darkened with closed doors and drawn shades and the sofa and chairs were shrouded with covers. It was a sort of mortuary chapel reserved for the reception of "company" and was closed to the family except on Sunday afternoon and evening. After 1890 the parlor was eliminated from new farm homes and the space utilized to much better advantage for a living room which was in daily use.

Every real farm home had flowers in the yard. After 1875 farmers gave more thought to enhancing the appearance of their homes by planting ornamental trees, shrubs, vines, and flowers. The favorite flowers in farm home yards and gardens long have been the zinnia, marigold, petunia, nasturtium, tulip, peony, rose, and sweet pea. The geranium still is queen of the kitchen window. Among Pennsylvania Germans the tulip has been the most treasured of all flowers since their ancestors came to America; it is the most common motif in the adornment of their furniture, glassware, earthenware, *fractur,* coverlets, samplers, and hooked rugs. It is even used in the adornment of their barns. Red roses of the House of Lancaster and white roses of the House of York still adorn farm homes in these and other counties. In the northern tier of counties New England influence is evidenced by the prevalence of Provence roses—semi-double, golden-hearted, and delightfully fragrant—and clove pinks; wherever Connecticut folks went they carried these two. The lilac is the most common flowering shrub of rural Pennsylvania; hardy, persistent, and fragrant, it stands guard over the ruins of cabin homes long after the builders returned to the dust from whence they came.

Pennsylvania Germans in general and Plain People in particular have a passion for neatness in home and yard. It is a common sight in "Dutch Country" to see a sun-bonneted matron industriously sweeping up the debris of a catalpa or some other lawn tree; while her sister in town sweeps the sidewalk in front of the house and scours the front steps.

The furniture of farm homes has undergone a transformation since 1840, and not all for the best. Until about 1860 it was the product of local craftsmen and was made mostly of local wood—white pine, black walnut, red maple, cherry. Many farm homes of today have treasured pieces of furniture that have been in the family for several generations—mahogany spinets, curly-maple bedsteads, mahogany high-poster bedsteads, carved sofas, bird's-eye maple cabinets, ladder-back chairs, red maple low-boys, cherry high-boys, mahogany secretaries with book-case tops, slant-top desks, nests of tables, corner cupboards, grandfather clocks, black walnut chests. In the halls of many Pennsylvania German farm homes stand chests that their forefathers brought with them from Europe, some carved in intricate and beautiful designs. They are large enough to hold the sheets, pillow cases, quilts, towels, and other hand-made articles that were considered essential in a well-ordered trousseau at that time. Black walnut furniture was the vogue about 1860; tables and dressers with marble tops were considered the height of elegance.

Soon after 1865 cheap processes of woodworking were developed. Factory-built furniture, though much cheaper than that built by local craftsmen, was less enduring and far less distinctive in design. About 1885, Grand Rapids, Michigan, was the furniture center of America. Every bride hoped to have her new home furnished with quartered oak or golden oak pieces from that city. Most local craftsmen, especially cabinet makers, sadly closed their shops. After 1890 practically all furniture was factory-made, some in atrocious design and flimsily constructed, but light and cheap. It was in marked contrast to the beauty and individuality of old pieces of furniture made with loving care by artisans of another generation.

Until about 1900, the floor of the parlor and living room was completely covered with carpets, often figured with flowers of gorgeous hue. They were tacked down snugly over a layer of paper or straw. During the annual spring house cleaning carpets were taken up and the accumulated dust of the year beaten out of them laboriously by the small boy of the family. By 1900 the use of several small rugs, instead of carpets, on a polished floor had become popular; they were not only more hygienic but also more artistic. The farmer's wife saved discarded garments, tore them into strips, and made closely-braided rag rugs and carpets in intricate designs. Wall paper, which began to be popular about 1850, often in garish designs, was abandoned by many after 1900 in favor of painted or tinted walls.

The farm-home parlor of 1840 to 1880 was a veritable museum. Heavy draperies hung at the few and narrow windows, giving it a somber appearance. On the walls were colored lithographs by Currier and Ives—clipper ships, race horses, idealistic landscapes, and other aspects of the American scene. Little did their owners think that, a century later, these would be resurrected from attic store rooms to serve a twentieth-century vogue. Crayon portraits of departed ancestors stared down, perhaps disapprovingly, from the walls. There, too, might be seen one or more mottoes, as "God Bless Our Home," worked with colored yarn on perforated cardboard; or chromos of "Washington Crossing the Delaware" and "The Spirit of '76." On the table were a red plush photograph album and copies of *Godey's Lady's Book* and *Friendship's Offering*. On the mantel was a bouquet of wax flowers or a piece of coral under a glass dome. Reposing on a "what-not" was a remarkable collection of small bric-a-brac and curios. On Sunday evenings the family gathered around the melodeon to sing "In the Sweet Bye and Bye" and "Yes, We'll Gather at the River."

After 1900 improvements in the arrangement and furnishing of farm homes came rapidly. They were less ornate and far less cluttered up. *Ladies' Home Journal*, founded in 1883, and *Good Housekeeping*, founded in 1885, were influential in this respect. More and larger windows admitted sunshine. Lighter furniture replaced the ponderous black walnut and mahogany. Upholstery of glossy and prickly horsehair or red plush gave way to coverings of leather or cretonne. Metal bedsteads replaced the top-heavy ones with elaborately carved headboards that reached almost to the ceiling. Spring bedsteads with well-stuffed cotton mattresses replaced slat or cord bedsteads with straw or corn husk mattresses. The sacrosanct parlor became a cheerful living room.

No state is richer than Pennsylvania in heirlooms that have been in the family for four to eight generations. Few prosperous farm families that have been here since before the Revolution are without some treasured bits of Stiegel glass. This famous craftsman began blowing glass at Elizabeth Furnace, Lancaster County, in 1762, and at Mannheim in 1765. His heavenly blue glass, when used as a baptismal font, was thought by many eighteenth-century Pennsylvania Germans to be prophylactic against whooping cough and a charm against the evil eye. Azure-blue Stiegel creamers and sugar bowls grace many an old-time corner cupboard.

HOME CONVENIENCES

After 1880 the drudgery of many farm women was lightened by the installation of home conveniences. The most helpful of these was running water in the kitchen. In 1870 it was estimated that, on an average, farm women lifted a ton a day in drawing water from the well or cistern or carrying it from the spring, putting it into different receptacles and emptying them. Possibly this estimate was too high, but even so, the labor was arduous and hastened the demise of many a frail wife and mother. Where a gravity supply from a spring at a higher level was available, this was the most expedient method of putting water into the kitchen, either directly or through an elevated storage tank located in the attic or outside. About 1870, windmills became the most common means of lifting water; at that time a good windmill could be installed for about $40. Soon thereafter hydraulic rams were used when a stream with sufficient fall was available. The basement pressure-tank system which dispensed with the elevated tank developed after 1900; at first the water was pumped by hand, later by electric or gas engine power.

Kitchen sinks were hardly known in farm homes until after 1860; dish, bath, and wash water was thrown out the kitchen door. A few homes had built-in black walnut bath tubs, sometimes lined with zinc, but absence of running water usually made these impracticable. On Saturday evening each member of the family took a bath before the kitchen stove in the wooden tub used for washing clothes. By 1900 a few farmhouses had enamel or porcelain-lined bath tubs which were supplied with cold water under pressure, but hot water was available only from the kitchen stove.

Soap was home-made. Wood ashes from the stove or fireplace were dumped into a covered barrel or "lye hopper" standing by the kitchen door. When this was full, water was poured on the ashes and the drippings were caught in a crock. This lye water and long-accumulated scraps of fat were boiled together in an iron kettle hanging from a pole in the yard. When the unsavory mess had cooled it was cut into chunks; this soap served for the bath, the toilet, and the wash.

The out-of-door privy reigned supreme on most farms until after 1900, when water under pressure began to be more generally available. The principles of sanitation were not generally understood or observed; sometimes these buildings were located where the seepage could contaminate the well or spring.

After 1900 the more prosperous farmers began to install plumbing systems, including bathrooms. By 1915, gas engines were commonly used to pump water. The rapid expansion of rural electrification after

1930 made this more convenient source of power available to many farms. Septic tanks began to supplant cesspools; in some rural communities knock-down forms were passed from one farm to another. In 1936, sixty-three per cent of the farm homes of Berks County had flowing water. A survey in that county revealed that in farm homes without running water the farmer's wife carried an average of fifteen buckets a day from the well or spring to the kitchen, an average distance of fifty-four feet.[2] Plumbing facilities were most likely to be lacking in the mountainous districts of the State where agriculture was less profitable; in the more prosperous farming districts, practically every farm had them.

About 1840 the kitchen stove began to displace the fireplace as a means of heating the farm home. Early stoves were merely fireboxes about eighteen inches long and twelve inches wide, with two lids for cooking. An oven was added later. They burned wood, which then was the almost-universal fuel. Each winter the farmer and his sons cut and split enough wood to last through the following year; long piles were stacked in the back yard or woodshed of every well-ordered farm home. Even these primitive wood-burning stoves gave more heat than a fireplace and also were more cleanly and saved labor. A stove for burning anthracite was invented by Eliphalet Nott in 1830. By 1870 base-burner coal stoves surmounted with tall urns and with the blaze showing through mica windows were common. Any woman who had a "Crown Jewel" or "Art Garland" considered herself fortunate. In western Pennsylvania soft coal grates were used. Soon thereafter practicable hot-air and hot-water furnaces were available, but few farmers installed central heating plants until after 1900. In 1940 about one-quarter of Pennsylvania farm homes were equipped with central heating systems.

In 1840 many farm homes were dimly lighted with candles or lamps that burned heavy animal fats, commonly whale oil and lard oil; the sputtering wicks made a prodigious stench. "Coal oil" was first distilled from coal in 1854; by 1860 there were ten such distilleries in Pennsylvania. Distilled coal oil was little used by farmers; it was too costly. In 1859 the first natural petroleum well was sunk at Titusville by Edward L. Drake. The kerosene lamp then became almost the sole means of lighting farm homes until after 1920. In early years, much of the kerosene was of inferior quality and lamps frequently exploded; improvements in refining soon removed this hazard.

Thomas Edison patented his carbonized-filament electric-light bulb in 1880. Electricity soon superseded kerosene and gas for lighting urban homes and streets, but not until after 1930 did any considerable number of farms have electric current. A few generated electricity on the farm by means of the "Delco" and other lighting plants, but most farmers had to wait for commercial current. Electric power companies were slow in extending their lines into rural districts until they were guaranteed sufficient use of current to make the extension profitable. On January 1, 1942, 111,800 of the 170,000 farms were electrified.[3] For a brief period before electricity was available, between 1900 and 1910, some farm homes and barns were lighted with acetylene gas generated on the premises.

Few of the numerous labor-saving devices and machines developed between 1860 and 1900 were for use in the farm home; practically all were for use on the farm. Women continued to perform their household tasks in about the same way as the women of preceding generations. Possession of a kitchen sink was enough to cause excited comment in the neighborhood. A hand-operated washing machine and wringer was patented in 1869; but not until after 1930, when electric current became more generally available in rural districts, was this great labor-saving device used on the farm to any extent. Before 1900 a few farms had party-line telephones, the batteries of which were under a terrific strain when ten to fifteen neighbors took down their receivers to "listen in." Electric lights, ranges, refrigerators, vacuum cleaners, and other devices for saving the time and strength of housewives were practically unknown on farms until after 1930.

The drudgery of washday was enough to take the joy out of the farm woman's life; no wonder it was called "blue Monday." The ponderous sad-iron came by its name honestly. After 1930, electric washing machines, driers, and irons greatly lightened the burden of washing and made it independent of the weather. On January 1, 1942, about two-thirds of Pennsylvania farm homes were serviced with electric current which was used to lighten the load of the housewife. Even that most obnoxious household task, dish washing, could be made easier by the use of an electric dishwasher.

FOOD

After 1840, the long dinner horn was supplanted by the far-more-musical dinner bell. Throughout the southeastern counties nearly every farm had a bell mounted on a post by the kitchen door or on the roof of an outbuilding; the woman of the house used it to summon her menfolk from the field. These bells were about thirteen inches high and weighed a hundred pounds. Their mellow tones were sweet music to weary farmers and their sons working in distant fields; they could be heard a mile away.

Farmers are valiant trenchermen. The tables of prosperous farmers are spread with substantial food in quantity and variety. Prior to 1880, the three meals a day were practically identical. Meat, mainly home-slaughtered pork, was the *piece de resistance;* vegetables, except potatoes and cabbage, were in limited supply. "Red meat" (beef) was reserved for special occasions except at slaughtering time. Until after 1880, many farmers were reluctant to rise from the breakfast table during the winter until they had eaten a big stack of buckwheat cakes smothered in maple syrup; buckwheat sponge was set with yeast in a large crock and was kept growing week in, week out. Pies—apple, cherry, peach, and many others—were served at every meal. Often they were baked in the great out-of-door Dutch oven. The farmer's wife was "as busy as a bee" cooking for her husband and brood of hungry children; at threshing time, with all the extra hands to feed, she was fairly distraught.

"The importance of food [to the Pennsylvania Dutch]," says Cornelius Weygandt, "is writ large on the buildings about the farmhouse. Beside outdoor ground-cellar, which reveals itself in the dooryard by mound of turf and ventilator, there are outside oven and smokehouse and apple-butter shed. . . . In some instances the bake-oven opens into the house kitchen; in others into the summer kitchen, which is generally wholly detached from the house. Often, however, the oven is a structure all by itself, with a little shed to it, overhanging at the mouth end of the oven, to protect the women baking from the weather."[4]

Until after 1880, nearly every farmer's wife baked bread, often in an outside oven. She set great batches of dough to rise in the doughtry which now, polished and replendent, serves as an ornate table in the living room of her grand-daughter. In choosing a wife, a young farmer was strongly influenced by the quality of the bread made by the maiden who had found favor in his eyes in other respects. In 1861 a committee of men appointed to judge the bread exhibited at the annual fair of the Chester County Agricultural Society voiced the deep distrust of the average male of that time in women who did not make good bread. The committee discoursed upon "the art and mystery of bread-baking, without which . . . no woman should ever be elevated to the dignity and responsibility of presiding over the household destinies. . . . We have very little doubt, from what we read in the newspapers, that a large majority of all the 'unhappy matches' made in the world, is the direct consequence of heavy or sour bread upon the breakfast table—as we consider this the only provocative that would justify a man in being 'out of humor' with his wife."[5] Bread often was baked in narrow loaves sometimes two feet in length.

After 1900 commercial bread began to displace home-made bread in the country, as it had for many years in the city. Farm families began to patronize baker carts which had regular routes through the countryside. By 1900 few farm families ate bread made from grain produced on the home farm, as had been done for generations; baker's bread was cheaper and more uniform in quality; and an arduous task was transferred from farm women to men. Prior to 1880 flour was not refined; thereafter whole wheat flour, dark in color but nutritious, was in little demand; the public preferred bread made from white or processed flour. In recent years the deficiencies of processed flour, as compared with whole wheat flour, have been restored by enriching it with vitamins, iron, and other nutritional factors that are removed from whole wheat in modern milling. Bakery pastries supplanted home-made pies and cakes to a much less extent. In 1917 the National Food Administration, a war-time agency, shocked Pennsylvania farm housewives by urging them to save flour by making pies without either top or bottom crust; they asserted that a crustless pie is not a pie at all, merely a pudding.

Before 1870, practically every farm family prepared enough dried, smoked, and salted meat, mostly pork and beef, to last through the year. Thereafter, farm butchering dwindled; farmers began to patronize butcher carts and fish carts which made the rounds through rural districts, their approach announced by raucous blasts of a horn. Home butchering, however, mainly hogs, still accounts for a large proportion of the farmers' meat.

Before 1920 a Pennsylvania German housewife would have been mortified if she could not set before her guests the mythical "seven sweets and seven sours." The sweets might be selected from rice pudding, apple sauce, quince preserve, wild strawberry preserve, candied watermelon rind, apple pie, raisin pie, apple butter, several kinds of cakes, and other toothsome dishes. The sours might be selected from pickled beets, coleslaw, chow chow, dill pickles, pickled cabbage, green tomato relish, pickled onions, horse radish, pickled gherkins, pickled cauliflower, and other palate ticklers. The legendary fourteen now are seldom seen at one meal.

Recipes that originated two centuries or more ago still are used. "Where will you come upon a man outside of Pennsylvania Dutchland," asks Cornelius Weygandt, "to know all the concoctions of corn I list below? Here they are: green corn soup, chicken corn soup, milk corn soup, corn chowder, corn floats, corn-hash, corn-fry, corn-noodles, Welshkorn oysters, corn-pie and corn waffles."[6]

In no other phase of food has there been a greater change than in methods of preservation. In the days of self-sufficing farming, practically all food was home grown and home stored. "At the onset of winter," says Cornelius Weygandt, "the outdoor ground-cellars of our country homes are crowded with many sorts of food, milk products, vegetables, fowls salted down. Smokehouses are filled with cured meat, hams and sides of bacon and burlapped sausages hanging there as thick as bees on the comb. Cupboards groan under crocks and jars of preserves and jellies."[7] In 1925 it was estimated that the farmers of Berks County put away at least 5,000 barrels of sauerkraut.

Before 1870, cool spring water was a major means of preserving food. Although the springhouse was built primarily for storing dairy products, it was used for the temporary preservation of many other kinds of food. Sometimes almost the entire meal—cold meat, potatoes, custards, salads, pickles, milk, and butter—was brought to the table from the springhouse. The house cellar or outdoor cellar might serve the same purpose. Until about 1880, the ice house, packed tightly with blocks of ice cut from a nearby pond and insulated with sawdust, was a common means of preserving food, especially in the northern counties. A wooden ice box stood in the woodshed; porcelain-lined refrigerators came into use much later.

Mechanical refrigeration was made possible in farm homes when electric current became more generally available, about 1930. After 1935, some farmers, especially those who butchered, began to patronize commercial cold-storage lockers. Instead of carrying meat through the long curing process that formerly had been considered essential, they stored it in the rented lockers of quick-freezing plants; thereby fresh meats and vegetables were made available the year round. In some communities, farmers cooperated to build and operate such storage plants. This relieved the farmer and his wife of much work in the processing of fruits and vegetables and the smoking and salting of meats. Home deep-freezing units did not become available until after 1940.

The diet of farm families is much more varied now than it used to be, but most of the food still is produced on the farm. A survey made in 1922 revealed that, on the average, three-fifths was home raised.[7] After 1880, tropical and sub-tropical fruits, mainly oranges, grapefruit, and bananas, became available. By far the most important dietary change in recent years is the much larger use of green foods. The research of McCallum and others, about 1915, showed the existence of certain life-giving substances in food other than the proteins, carbohydrates, fats, and mineral salts that formerly had been considered the sole factors in nutrition. These new substances were named vitamins. From time to time new vitamins were discovered; by 1938 eleven were known to science. The effect of these discoveries has been to increase greatly the use of milk, fruits, and vegetables the year around.

The "pre-digested" breakfast foods that flooded the market after 1900 found few takers in rural districts at first; most farm families remained partial to the more substantial oatmeal and corn meal mush until recent years. Farm as well as urban families have benefited by pure-food legislation, beginning with the Congressional Act of June 30, 1906; this has removed from the market most of the grossly adulterated or misrepresented food products.

The last stronghold of self-sufficing farming—the Amish of Lancaster County and elsewhere—gradually is giving way to commercialism. Walter Kollmorgen reports this shift: "As commercialization was extended and intensified, self-sufficiency declined. Today the Amish farmers' production and consumption are closely tied up with the market economy. . . . Today they buy some ready-made clothes; they buy most of the fruit and some of the vegetables they eat. If the housewife still bakes bread, she buys flour made from western wheat. Local wheat, when sold, is used as a pastry flour. Many farmers buy the pigs they later kill for meat. . . . Many Amish housewives still can and preserve great quantities as well as a great variety of food. To can from 500 to 700 quarts of fruits and vegetables is not uncommon. In addition, many still prepare many gallons of apple and pear butter, can and preserve much meat, prepare great quantities of jellies, and store away impressive quantities of dried apples, beans, and corn. . . . More and more of them are becoming convinced that the finished product can be bought at a saving—and they act accordingly."[8]

During the century there were marked changes in the beverages commonly used in farm homes. In 1840 and for several decades thereafter, homemade alcoholic drinks were considered essential. Apple cider was made in large quantity, perhaps fifteen or more barrels a year to a family. Much home made "small beer" was drunk; this was made of wheat bran, molasses, hops, yeast, ginger, sassafras roots, and water. Nearly every housewife made wines and cordials for use on special occasions. Some farm families still are partial to these stimulating beverages, though to a much less extent than in former years. Speaking in 1929 of conditions in the "Dutch country," a native said, "Hanging shelves and wall racks in the house-cellars are stacked to their capacity with jugs of cordial and bottles of wine, homemade all of it. A row of cider barrels, fifty-gallon fellows, is ranged along the wall under the racks and shelves in every well-conducted home. . . . We have always liked cider and wine . . . wild cherry wine . . . wines made of grapes . . . We like, too, dandelion wine, and wine of white clover. And elderberry wine and blackberry wine, and a wine of wild plums. This plum wine is subtle in its attack, being slow to kindle you, but heady at the end."[9]

After 1875, coffee, tea, milk, and water gradually displaced cider, beer, and other liquors as the main beverages in most farm homes. Under the leadership of the churches, the Anti-Saloon League, the Women's Christian Temperance Union, and the Grange, and spurred on by the war-time need for more food, Pennsylvania joined the procession of states that ratified the national prohibition law; this went into effect January 16, 1920. The Grange sent this resolution to

Congress: "The Pennsylvania State Grange, representing a membership of 68,000, . . . earnestly opposes the further wastage of grain, sugar, coal, transportation, and manpower in the making of intoxicating liquors."[10] Homemade beverages came under the ban of the law since they contained over one-half of one per cent of alcohol. This war-time legislation proved to be premature; it was not supported by majority public sentiment. On December 5, 1933, Utah became the thirty-sixth state to ratify the twenty-first amendment to the Constitution which wrote off the national prohibition law of 1920 as a failure. Since then the influence of farmers, as a class, has consistently been exerted for the extension of temperance through local option. Paved roads and moter delivery, however, have increased the number of rural taverns and public drinking places.

Until about 1900, farmers chewed tobacco and smoked pipes; cigars were reserved for special occasions. Cigarettes were little used by tillers of the soil until after World War I; then even some farm women acquired the habit. Few rural youth of 1940 of either sex would be able to qualify for matrimony on the basis of terms set forth in 1857 by a lonely heart who advertised in a farm journal: "A Bachelor . . . desiring to say to the Lady readers of the *Farmer* that he is of good character, healthy, intelligent, enterprising, warm hearted and moderately good looking, abjures tea, coffee, tobacco and spirituous liquors, now desires to be united to a Lady of like qualifications and habits."

CLOTHING

In 1840 many farm women, especially in the mountainous districts, still spun the wool of sheep raised on the home farm; usually the yarn was woven into cloth by an itinerant weaver. If factory-made cloth was bought, the housewife made garments for all the family from it except, possibly, the "Sunday best" of her husband. There were few changes of clothes. A Lycoming County farmer thus recalled his boyhood days, about 1850: "Not one man in twenty had an overcoat, and one pair of shoes was the allowance of a growing boy or girl for winter's use. When they were worn out, we went barefooted. My grandmother's story may illustrate it. On Sundays they would walk within sight of the church, carrying their shoes, and on returning home would remove them. . . . Rigid economy was enforced. Money was made and farms paid for by savings"[11] Scratchy red flannel underwear was worn all winter, day and night.

Few farm women were victims of the prevailing city fashions. They did not join in the bloomer craze of the early 1850's or in the hoop skirt mania that succeeded it. In 1856 a young lady contributor to a farm journal championed hoop skirts because they were "very airy" and because they "kept men at their distance." Ladies who affected hoop skirts sometimes had embarrassing experiences; the billowing petticoats and skirts, stretched wide over a flexible wire framework, were difficult to control on crowded sidewalks or in church pews. Few farm women imprisoned themselves in tight corsets that gave them wasp-like waists; neither did they wear trailing skirts, "street-cleaning style," as *Harper's Bazaar* aptly put it. Their apparel was far more practical: it would have been absurd to try to milk a cow or lend a hand in the hay field in such costume.

There were few ready-made clothes for women until after 1880; they bought cloth and made garments themselves or employed the village old maid dressmaker, who stayed at the farm long enough to make clothes for all the family. Sewing machines, based on Howe's patent of 1846 and Singer's patent of 1851, were exhibited at fairs and soon were distributed to farm homes. Some agricultural journals opposed them; said one in 1860, "Singer's Sewing Machine never sings and is no compensation for the loss of the blue-eyed girls that used to sew and sing in the old homestead." Needless to say, it was a man speaking.

Until about 1870 the clothing of farm men, except their Sunday best, was mostly homemade, even though the price of factory clothes was not exorbitant, as judged by present standards. In 1875 the prevailing prices were: shirt, thirty cents; overalls, fifty cents; shoes, one dollar; straw hat, ten cents; a good woolen suit, $10. The knitting needles of farm women clicked busily during the evening hours making socks, scarfs, mittens, and wristbands ("to keep the pulse warm") for their menfolks. Charles Goodyear invented a rubber-vulcanizing process in 1844, but most farmers preferred to wear high, heavy, leather boots which were kept water-proofed by greasing them frequently with suet, well rubbed in. When a young farmer went courting, he slicked down his unruly hair with bear grease. For nearly three centuries the principal use of beaver fur was to make beaver hats; after 1870 these began to give way to felt hats.

From 1860 until 1890, most men sought to camouflage their faces with hirsute appendages. This practice became common during the Civil War. In 1873 the management of the Philadelphia and Reading Railroad issued an order requiring that all its employees be clean shaven. Rather than submit to this indignity, the men walked out in a body carrying with them the side rods of all engines and the coupling pins of all cars. The railroad management quickly came to terms. The mustache cup, which was invented to meet the exigencies of the unshaven upper lip, flourished during this period. After 1910 the safety razor brought relief to men and their admiring womenfolks.

About 1880 the clothing of farm families began to conform to that of city folks and to a machine civilization. The increasing activity of women in all walks of life put an end to bustles, sweeping skirts, stiffly starched petticoats, and confining corsets; their garb became increasingly light, comfortable, and serviceable. When they attended social functions, however, farm women were likely to conform to the edicts of fashion. Mrs. Flora B. Black of Somerset County, founder of the Pennsylvania Society of Farm Women, thus describes the dress of women present at the organization meeting in her home in 1914: "We all wore high-waisted, heavy dresses and a great superfluity of underclothes. Stiff corsets pulled in our waists and left us with very little breath to talk. Our shoes were ugly and high-laced. Long skirts hid our cotton stockings. No wonder we moved—and thought—slowly."

After World War I there was little change in men's wear, but a revolution took place in women's clothing. Skirts were shortened from ankle length to knee length, or thereabouts, hampering corsets were discarded, silk or rayon stockings displaced cotton; dungarees, slacks, and overalls were worn about the farm. Women invaded the last refuge of masculinity, the barber shop, to have their hair bobbed.

The garb of some Pennsylvania German sectarians, however, has not changed materially for centuries. Quakers have long since discarded plain clothes and Schwenkfelder women no longer wear white capes and distinctive hoods. Most Dunkers now are attired like other people. But Amish, Mennonites, and River Brethren, especially Amish, wear clothes that sharply differentiate them from the "World's People." The Amish garb is described by Walter Kollmorgen: "The Amish men all have long hair, banged across the forehead and at the back of the head. . . . Unmarried men shave, but married men must wear a beard though they may not grow a mustache. The outer articles of clothing for men, women, and children are made at home and are cut along the same patterns for each group. The men and boys wear broadfall trousers, . . . The dress coats have no lapels and no outer pockets and are secured with hooks and eyes. . . . All male members wear broad, flat, black hats in winter and broad, flat straw hats in summer. Women of the same age groups wear outer clothing of identical pattern and none of it is made of printed goods. Only solid colors are worn . . . black, blue, purple, and grey are popular. Married women wear aprons which match the color of their dresses, whereas young, unmarried girls wear white aprons. No woman is permitted to cut or curl her hair and all comb their hair exactly alike. . . . Owning or wearing jewelry is forbidden by the church. Girls and women wear white devotional head covering and identical hand-made bonnets. Church regulations forbid the wearing of all 'store hats.'"[12] Since there are no style changes among the Amish, clothes never are discarded until they wear out.

Some of the young people of this most conservative group of farmers in America have been tempted to depart from the traditional costume of the sect and to adopt, in part, the garb of the "World's People." This trend has been accelerated by mixing with children of other religious faiths in consolidated schools. It is probable that, ultimately, the bonnets and broadbrims of the Separatist sects will give way to the prevailing mode of dress, but the process will be very slow.

RURAL HEALTH

In spite of their out-of-door life and greater isolation, rural people have not had as good health as urban people. This has been due primarily to poorer sanitation on the farm and inadequate medical service. Prior to 1880, the care of the sick, except in the most severe cases, was left to the ministrations of the women. Grandmother's treatment of a severe cold was to dose the sufferer with castor oil and grease his chest with kerosene and lard; this was "baked in" by standing in front of the kitchen stove. When the patient went to bed, his feet were soaked in water to which a tablespoonful of mustard was added, the water being kept "as hot as you can stand it." The final indignity was a liberal dose of horrible-tasting wild cherry bark decoction. A "round of calomel" was considered an infallible remedy for a great variety of ailments. It was imperative to keep the stomach warm in winter with red flannel. In the spring all children had to undergo a course of sulphur and molasses to "purify the blood."

Within the limitations of current medical knowledge, country doctors were remarkably effective. Some credulous farm families, mainly Pennsylvania Germans, continued to send for the powwow man instead of a registered doctor; the incantations of these wholly untrained men had their origin in the ignorance and superstition of the Middle Ages.

Some diseases did not yield to the heroic remedies of the time. Until after 1875, small pox was likely to strike anywhere in the State during the winter months; the epidemic of 1860-1861 was particularly mortal. Vaccination was not compulsory then and was not available to many coutry people. In 1849 cholera swept the State; days for fasting and prayer were appointed in many rural communities. "In 1840," says W. J. McKnight of Jefferson County, "the 'itch' was in Brookville, and popular all the year round. As bath-tubs were unknown and family bathing rare, this itch was the seven-year kind. Head-lice among the people and in the schools were also common. . . . The only cure for lice was to 'rid' out the hair every few days with a big, coarse comb, crack the nits between the thumb-nails, and then saturate the hair with 'red precipity,' using a fine-tooth comb."[13]

About 1900 the general practitioner or family doctor began to disappear from rural districts. Between 1900 and 1925, the ratio of country doctors to rural population in Pennsylvania decreased twenty per cent. Some rural districts were without medical service during the great influenza epidemic of the winter of 1918-1919, and the death toll was heavy. After 1930, most doctors resided in cities and towns. Good roads and automobiles made it possible for country people to go to town for medical care and greatly extended the radius of service of doctors.

In 1917 a joint committee of the American Medical Association and the National Council on Education made a study of country-wide medical statistics and reached this conclusion: "Country school children are from three to fourteen per cent more unhealthy than city children. In every health item, as lungs, heart, anemia, and nutrition, the country child is more defective than the child raised in the city." The committee attributed this unsatisfactory condition primarily to poor sanitation on farms. It also asserted, "Rural schools, on the average, are less adequate for their purpose than prisons and dairy barns."

In 1924 *Pennsylvania Farmer* reported, "Many persons were shocked some years ago when figures were published showing that the average city man lived longer than the average country dweller—that sickness and disease were more prevalent out where the fields are green and the air is pure than in the congested cities with their crowded apartments and burning pavements. Figures collected by the Census Bureau show that in nine states [including Pennsylvania] the percentage of country babies who die within a year of their birth is greater than the number of city infants who fail to survive their first year."[14] Most of this disparity was attributed to lack of sewage-disposal systems and to contaminated water supplies in rural districts.

After 1905, facilities for conserving rural health began to improve. The State Department of Health appointed a Medical Director in each county, usually a part-time practicing physician, to guard the public health. He was responsible for imposing quarantines when necessary, abating unsanitary nuisances, and cooperating with schools in suppressing epidemics of contagious diseases. Frequent tuberculosis, prenatal, well-baby, and other clinics were held. After 1920, the district Red Cross nurse was available to help care for the sick in country homes; in 1940 there were 118 such nurses. Most fourth-class school districts, however, did not employ school nurses; only the State nurse was available to make regular checks on the health of school children. Hospital service in rural Pennsylvania continued to fall far short of meeting the need; in 1940 ten counties, having a combined population of 145,000 people, had no hospital beds at all.

Although the health of rural people has improved greatly since 1900, it still is below that of urban people. A recent survey of families in representative districts of rural Pennsylvania led to this conclusion: "Rural people are ill to about the same extent as urban people, but their proportion of illnesses not attended by a physician is about twice that of urban people. . . . They use a hospital about two-thirds as often. . . . The school health examinations found defects more frequent in rural children, and a smaller per cent of these defects had been corrected."[15] There are areas, especially in the northern and central counties, in which no doctor is available within twenty-five miles.

FAMILY LIFE

In no other aspect of Pennsylvania agriculture has there been greater change during the century than in family life. In 1840 the era of self-sufficing farming was drawing to a close. There had been a close-knit family life centering around the hearthstone. In 1905 a Dauphin County woman sighed for her girlhood days on the farm, about 1850. She said, "The home was a place of varied and vital activities. The father and the boys plowed, sowed, reaped; raised horses and cattle and sheep; dragged out firewood and lumber from the forest; drew or carried grain to mill and brought back bran, shorts and flour; they made and mended simple tools, and built houses and barns. The mother and the daughters baked, cooked, made butter, cheese, jellies; spun and wove; sewed and knit; learned and practiced millinery and dressmaking. What a place for educating the boy or the girl was the old time farm! In every one of these activities there lay a summons to skill, a drawing forth of faculty, a demand for adjustment. In addition to these activities, there was the constant daily companionship and mutual co-working of parents with children. . . . In the home of to-day hardly one of the old activities remains, and in multitudes of homes, no new ones have risen to replace them. Work is 'done out,' or given over to hirelings or to machines, companionship is increasingly crowded out, instruction and even training are incidentally given over to outsiders. . . ."[16]

These nostalgic memories were softened by the blur of time. Little was remembered, or said, of the inconveniences, hardships, drudgery, and isolation of rural life at that time. Frozen feet and fingers were a common experience of men and boys who had to work in the woods during the winter cutting firewood; nearly all suffered severely from chilblains.

Boys and girls, as well as their parents, were obliged to work hard as a matter of family necessity. Any who might be inclined to indolence were cured by liberal doses of a strong medicine that had been recommended three centuries earlier: "A cure for ye Lazie Fevre . . . wyth wich many yonge men, yonge wemen, madyns and other yonge persons be sorely infected now-a-days . . . take a sticke or wand, of a yard of length and more, and lett itt bee so grate as a man's fynger; and with itt annoynt ye back and shoulders well, mornings and evenings, and thys doe twenty-one days."[17]

Woman bore the brunt of the drudgery caused by lack of household conveniences which are almost universal today. With what bitter humor they must have read the sage counsel of a city man in 1850: "Circumstances have thrown the healthful spinning wheel and loom into the garret. Household work does not furnish sufficient employment for females. Farmers' wives and daughters should resort to something else by which to contribute their share to the support of the family. I appeal to mothers to give their daughters daily and thorough training in the care of the dairy. It were well, too, if they revived the acquaintance which their mothers had with the milking stool, the garden, and the field. Then bloom would flow in fuller tides through all their veins."

Bloom already had fled from the veins of the Dauphin County farmer's wife whom A. B. Farquhar met about 1850. He said, "Just before the Civil War I visited a farmer who lived north of Harrisburg. His wife waited on the table while we were eating our supper and afterward made her meal out of what was left without even sitting down but taking a bite while attending to her household duties and looking after the children. With no other help than a twelve-year-old daughter she prepared meals for a dozen harvest hands while looking after her two youngest babies. The farmer and his help went to bed shortly after supper; his wife did not finish her work until nearly ten o'clock. At half-past four in the morning I saw her going to milk the cows. She had breakfast ready for all the menfolks at six o'clock. Needless to say she was worn to skin and bone."[18] She, and many like her, soon rested in the church yard. In the sixteenth century Thomas Tusser wrote truly:

> Though husbandry seemeth to bring in gains,
> Yet huswifery labours seem equal in pains;
> Some respite to husbands the weather may send,
> But huswife affairs have never no end.[19]

As the years passed, labor-saving devices lightened the work of the farmer's wife considerably, especially after 1930, when electricity became more generally available. Nevertheless, woman's work continued to be exacting. A survey made in 1900 revealed that farmers' wives worked an average of sixty-three hours a week, of which fifty-two were on home-making and eleven on the care of poultry, dairy, and garden, and on other outside activities.

RURAL SOCIAL CHANGES

In 1840 the legal rights of married women still were governed by the common law. This was stated by Blackstone: "By marriage, the husband and wife are one person in law: that is, the very being or legal existence of the woman is suspended during the marriage, or at least is incorporated and consolidated into that of her husband: under whose wing, protection, and *cover* she performs every thing."[20] William J. McKnight commented, "The rights surrendered by a woman marrying under the common law were two: First, the right to make a contract; secondly, the right to property and her own earnings. To compensate for this she acquired *one right*—the right to be chastised [by her husband]."[21] An Act of Assembly of April 11, 1848, modified somewhat the harsh injustice of the common law. From time to time, additional Acts granted to wives other legal rights; not until 1893 did they have the same rights as unmarried women, including control of their earnings and property, but they still could not convey real estate or execute mortgages.

In 1840 only seven respectable vocations were open to women—marriage, housekeeping, school-teaching, sewing, weaving, type-setting, and book-binding. Few entered any of these except marriage unless forced to do so by dire necessity. By 1860 many other avenues of service were open to women, and marriage became somewhat more optional. After 1870, divorce, which heretofore had been practically non-existent, began to be a matter of public concern. The constantly increasing absorption of women in interests outside the home contributed to the waning sanctity of the marriage relation. By 1890, the divorce rate was three times greater than in 1870; but most of the broken families were urban, not rural. In 1848 the first "women's rights" (suffrage) convention was held at Seneca Falls, New York. It was greeted by jeers from men, ridicule from the press, and solemn warning from the pulpit as unscriptural. Not until 1920 did women win the right to vote.

As the intensity and speed of life increased, marriage was more commonly regarded as a convenience rather than as a sacred obligation. The divorce rate increased from fifty-three to each 100,000 population in 1890 to 112 in 1916, and was progressively greater thereafter. It was far less prevalent in farm families than in urban families, largely because life on the farm tends to cement family ties. Among German sectarians, loyalty to the family as a social unit is a cardinal article of religious faith; divorce is practically unknown among the Plain People.

After 1880, most farm families became progressively smaller, with German sectarians a notable exception. This was due in part to later marriage, girls commonly marrying when twenty to twenty-four instead of sixteen to eighteen, as in 1840, but mostly to the increasing economic disadvantage of large families. With the greatly extended period of required school attendance, so that children could contribute relatively little to the operation of the farm, together with higher standards of living, they became an economic liability instead of an economic asset.

"Race suicide," as President Theodore Roosevelt termed it, was far less prevalent in the country than in the city. In 1925 the average number of children in Pennsylvania farm families was three as compared to six or more a century earlier. "The modern urban philosophy of life," said Oliver E. Baker in 1939, "apparently, tends toward extinction; the rural philosophy of life tends toward survival. . . . If the rural people accept the urban philosophy of life, . . . the hope of building a permanent civilization will perish."[22]

The social advantages and standard of living of farm families have risen constantly since 1900. In August, 1908, President Theodore Roosevelt appointed a Country Life Commission to inquire into rural social conditions. He said, "The great rural interests are human interests. It is at least as important that the farmer should get the largest possible return in comfort and social advantage from the crops he grows as that he shall get the largest possible return in money. Good crops are of little value to the farmer unless they open the door to a good kind of life on the farm."

Some farmers resented this inquiry as "rural slumming" and an attempt to "uplift the farmer." Said *National Stockman and Farmer,* "By what authority are farmers declared, both directly and by implication, to be behind other great classes of people and in need of investigation to provide a basis for their uplift?"[23] The recommendations of the Commission, however, led to more general recognition of deficiencies in rural life and ultimately to improvement. The farmer desires to have the comforts and conveniences of life as much as anyone, but first must get the money to pay for them; profitable farming is prerequisite to rural social betterment. The more general prosperity of agriculture after 1900 made possible marked improvement in farm homes.

After 1900, "How to keep the boys on the farm" ceased to be a subject for doleful debate at meetings of farmers. It became recognized that many farm boys must find employment elsewhere; that mechanization has made it unnecessary for more than one or two to remain on the home farm to carry on after their father bows before the scythe of Father Time. In 1940, as many or more farm boys entered other vocations or professions as remained in farming.

Even the ultra-conservative Old Order Amish and Old Order Mennonites, to whom farming is a preferred way of life, find it increasingly difficult to keep their youth on the land. It is hard to perpetuate the old order in agriculture in a district that now is criss-crossed by highways leading to near-by industrial cities and towns. The problem is aggravated by the difficulty in securing land for their young people who desire to marry. For centuries it has been the custom in these communities for the parents of the groom to provide a farm for the young married couple and sometimes a house as well. He, in turn, feels obligated to do the same for his sons.

In 1840, a farmer was not expected to provide for the complete support of himself and his wife in their old age or for his widow in case his earthly pilgrimage should terminate first; but he was expected to accumulate something to help compensate his children or other relatives for a few years of care on the farm in the sunset of life. After 1880 it was customary for prosperous farmers, their days of active work on the farm over, to retire to a new home in a near-by rural village. Half the population of some country villages were retired farmers. In many cases this move proved to be a mistake, for reasons set forth by *Pennsylvania Farmer* in 1922:

"In a little town in a farming community the other day there was a funeral. . . . Thirty years ago this man, now dead, was a renter just married and started farming for himself. He and his wife started out to own a farm and succeeded. Within 15 years the farm was paid for and money banked. . . . The children didn't stay home. Then the couple moved to town. The farm was rented. That was four years ago.

"Every morning he got up early—he'd been doing it too long to change. There weren't any horses to bring in, feed or harness. There were no hogs to feed. No chores except to milk one cow. . . . He didn't know how to loaf. He didn't enjoy the chance to spend half a day at a time in the store or leaning against the hitch rack at the blacksmith shop. . . . Winter was a torture. He shoveled paths in the snow all over the lot and down the street.

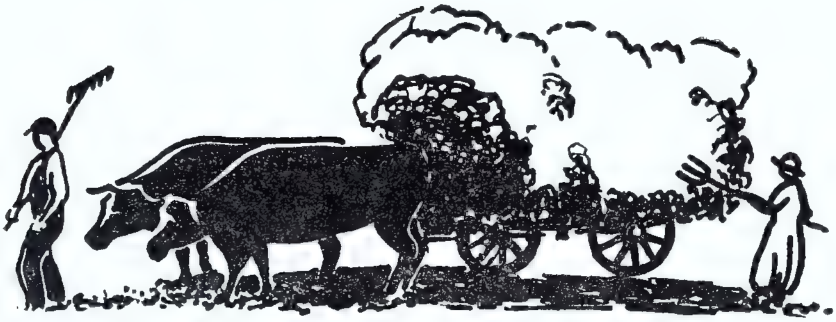
"He swept the porch and sidewalk almost every time the wind blew. . . . When spring came he'd go out to the farm. . . . Things didn't look so well out there since the renter took charge. . . ."[24] This moving human tragedy has been enacted in every rural village.

The retirement of aged Amish farmers is effected with far less break between the old life and the new. Although some live in villages, most of them remain on the farm. Says Walter Kollmorgen, "The aged Amishman and his wife cannot leave the farm in their declining years because of the church regulations. . . . The Amish farmer is rooted to the soil and that is where he wants to remain. When the time comes to retire from active farming—usually when the youngest son or daughter marries—the aging parents move to a separate part of the house known as 'Grossdawdy house.' . . . It may contain from one to three rooms downstairs and an equal number upstairs. House [religious] services and Grossdawdy additions help to explain why Old Order Amish cherish large houses. Grossdawdy does not retire from all work. . . . He finds as much work outside as he cares to do. Grossmutter sews during the day for children and grandchildren. This work keeps both of them healthily occupied. . . . It is doubtful that old people anywhere are more contented than the occupants of the Grossdawdy house who can associate daily with their children and grandchildren and yet can be separate."[25]

On a green grassy knoll, by the banks of the brook,
That so long and so often has watered his flock,
The old farmer rests in his long and last sleep,
While the waters a low, lapsing lullaby keep.
He has ploughed his last furrow, has reaped his last grain,
No morn shall awake him to labour again.

—Josiah T. Canning, "The Old Farmer's Elegy"[26]

XVIII



Old-time haying

COUNTRY LIFE

SINCE 1840 the process of urbanizing country people has constantly accelerated. They are rapidly losing the characteristics that once sharply distinguished them from city people and are acquiring the characteristics of urban residents in intellectual interests, social customs, dress, and home life. They now are within a few hours or a few minutes by automobile of a city or town, and are kept in touch with world affairs by the daily newspaper and radio. Many of their children go to consolidated schools, and the family may attend church in town. Each new application of science to agriculture has helped to undermine long-established rural customs. The replacement of self-sufficing farming by commercial farming has tended to develop greater dependence on cooperative action and less on individual effort. Farmers are no longer a class set apart; they are cosmopolitan.

Rural Social Institutions

The institutions that have struck their roots most deeply into the soil of rural life are the home, church, and school. Prior to 1880, nearly everyone in the country went to church; it was the center of the social as well as the religious life of the community. The same was true, though to a less degree, of the school. In recent years the Grange, Farmers' Clubs, Women's Clubs, Parent-Teachers' Associations, Agricutural Extension Associations, and other agencies have had important social functions. The more rural the county, the greater the ratio of social organizations to the number of people; thinly settled districts have more, in proportion to population, than more urbanized sections.

The admission of women as members of the Grange has contributed largely to rural social life. Through this organization, farmers and their wives and children have come together for friendly intercourse at picnics, festivals, and other social activities. In 1929, Chester County had seven community Farmers' Clubs, several of which had been meeting for more than seventy years. Their objectives were "to promote agricultural interests and social fellowship." All the family attended the meetings, which were held in farm homes.

The Pennsylvania Society of Farm Women, organized in 1914, developed into an important rural institution. In 1940 it had forty-two local units with over 1,000 members, mainly in the southeastern counties. The membership was mostly Pennsylvania Germans, who do not approve of secret societies. Originally the organization was called *Die Hausfrauen.* Meetings were held once a month, usually at a home, and were devoted to home and community betterment. Parent-Teachers' Associations in connection with public schools have had an important social as well as educational influence. Many farmers are members of secret societies other than the Grange.

By 1940, youth organizations, as Boy Scouts, Girl Scouts, Four-H Clubs, and Future Farmers of America, were functioning effectively in most rural communities; but in some there was a dearth of such activities. A survey of 225 families in Locust Township, Columbia County, made in 1930 revealed, "The social and recreational activities of the boys and girls of farm families centered in the school and the church. . . . The entire absence of organizations of boy scouts, camp fire girls, 4-H clubs, junior granges, and similar groups left a large majority of the youth without helpful leadership along recreational, entertainment, and vocational lines."[1]

In spite of the constantly-increasing speed and tension of rural life, the grace of neighborliness has not been lost. Farmers still "swap work," but not to the extent that they did fifty years ago. In 1870, a threshing outfit operated by five teams brought the farmers of a neighborhood together in cooperative labor. The threshing-day dinner and supper were occasions for much merry-making. Many Pomona and subordinate Granges have sponsored a series of "Neighbor Nights" devoted to visiting, picnics, and other social activities.

Before 1880, visits of several days' duration, sometimes several weeks', were common, especially among Pennsylvania Germans. After automobiles came into general use, long visits declined in popularity except among the Old Order Amish, most of whom live in compact groups of the same faith and abjure automobiles. According to Walter M. Kollmorgen, "There are only about thirty family names in the community and the great majority of the Amish families today have one or only half a dozen family names. During the course of the last two centuries these few families have intermarried constantly, so that the community is now one large *Freunschaft,* a term used to designate kinfolks."[2]

In time of sickness and distress, the neighborliness of country people is expressed in many helpful ways. In 1922 a Bucks County farmer was overtaken by severe illness. As reported by *Pennsylvania Farmer,* "Because he knew the potato crop was still in the ground . . . he worried, and his worriment militated against recovery. . . . Twenty-five of his neighbors . . . arrived unexpectedly at [his] farm Sunday . . . and before evening harvested 600 bushels of potatoes."[3] In 1927, according to *National Stockman and Farmer,* "A good farmer in Lebanon county had his arm torn off in a feed chopper the week before he had planned to make his hay. . . . Last week thirty of his neighbors went to his farm and put his hay crop away. They further told him not to worry, for his wheat and oats harvest will be well cared for."[4] If the barn of an Amishman burns down, his neighbors, perhaps numbering 200, gather at the farm one morning, and by nightfall have built a new barn. Countless other examples of the neighborly spirit that still prevails in the Pennsylvania countryside could be cited.

SOCIAL EVENTS IN THE HOME

Births, weddings, and funerals long have been outstanding events in rural social life, particularly among Pennsylvania Germans. In these, as in other respects, the trend is toward conformity to the prevailing urban custom; but some sectarians have preserved many of the distinctive social traditions of their respective groups. "In all sects," says Cornelius Weygandt, "much is made of birth, marriage and death. . . . Great preparations are made at home for the expected child. . . . The birth is carefully recorded in the family Bible. Yesterday it was recorded, too, in a *geburtsschein,* and baptism in a *taufschein,* in illuminated writing, and the records framed and hung on the wall like a sampler."[5]

The following description of Amish courtship and marriage of the present day might have been written two centuries ago: "During the courting period the young man calls on the girl after she (apparently) and the family (actually) have retired. He drives up to the house in his topless buggy and with the aid of a flashlight or buggy light makes his presence known. If the girl is interested she quietly descends the stairs to meet the caller. . . . Many preparations have been made during the years preceding the marriage. The girl will have spent much time filling a hope or dower chest with materials to set up housekeeping.

"Weddings in the Old Order Amish community always take place after the harvest season, and custom decrees that the wedding day fall on a Tuesday or Thursday. Some time before the wedding a Schteckleimann—a deacon or minister acting in the capacity of solicitor, like Abraham's servant—is selected to learn the attitude of the girl's parents concerning the marriage. . . . The function of this intermediary has become quite nominal in that the young man now is fully aware of the attitude of the girl and her parents. . . . Weddings are the most important social events known to the Amish. From 100 to 300 guests may be invited and a king's feast is prepared for them. The newly wedded couple later makes special visits to all families who participated in the wedding and at this time they receive the wedding gifts. Several weeks may be spent in this round of visiting."[6]

An Amish wedding ceremony may require three or four hours. There is a long sermon and much singing in slow time (hymns resembling Gregorian chants). Guests arrive about 8:30 A. M. and stay until late into the night. The return from the honeymoon of Pennsylvania Germans is celebrated by a charivari or ear-splitting serenade by a "Deitsch Band"—young people making a horrendous noise by pounding an old circular saw with a hammer; the original purpose was to drive away evil spirits.

Funerals are major social events among Pennsylvania Germans. Some families still follow the ancient custom of serving a bountiful feast. The custom of providing "funeral baked meats" no longer is common among most Pennsylvania Germans, but the Amish still cling to this tradition.

Until recent years, Christmas was observed almost wholly as a religious festival in the home and church. Members of the family might make simple gifts to each other, mostly home-made. Not until after 1840 were Christmas trees used generally. After 1880, Christmas was commercialized; gradually it became, unhappily, as much a business event as a religious festival.

Until after 1880, the Easter Egg Tree was popular among Pennsylvania Germans. A leafless little tree was strung with eggs, sometimes as many as 500. Before chemical dyes were available, eggs were dyed several colors with vegetable decoctions. Traditional Hallow-e'en goings-on prevailed until after 1900—such pranks as gate lifting, bell ringing, tick-tacking windows, the "lofting" of buggies and wagons to such impossible places as the roof of the carriage shed, and parades of "fantasticals" or "mummers."

FROLICS AND FESTIVALS

Frolics or bees, in which communal labor was pleasantly combined with entertainment, were common in the days of self-sufficing farming, but have gradually disappeared under the impact of commercial agriculture. The husking bee and apple butter bee, however, still are enjoyed in some rural districts. In 1931 *Pennyslvania Farmer* described a husking bee in Sullivan County: "Imagine a large bank barn with a double threshing floor, and approximately 700 bushels of unhusked corn piled in the center of it. . . . The corn huskers are seated on rough benches set up around the pile of corn. As they husk, the ears are tossed across their shoulders into the bins. . . . This is . . . an annual affair eagerly looked forward to by the folks living in one of the mountain valleys of Sullivan county. . . . It draws old and young alike. They covet the finding of a red ear as much as their elders ever did. They enjoy sandwiches made from meat of one of 'Daddy' Norton's fattened lambs. And Grandmother's cookies, cakes and coffee. . . . The 250 people present . . . had a splendid evening and with it all they helped Mr. Norton finish quickly a task which if he had to do it alone, would have become a tiresome job."[7]

A few barn raisings still take place, mainly in "Dutch country." Says an interested observer, "The rapidity with which a barn is erected by this cooperative method is amazing to outsiders. First, several carpenters are hired to prepare the foundation for the barn and to pre-cut all the required pieces of lumber. When these preliminaries are done, word is sent out that the barn-raising is to take place on a certain day. Farmers come from all directions early in the morning and the work of setting up the barn begins immediately under the direction of a foreman or boss. By evening, a $5,000 to $10,000 barn stands erected, although the shingles may not all be in place. It is not unusual for 200 and 300 farmers . . . to take part. . . . All get a big dinner."[8]

Until about 1890, woodchopping bees were common; they still are found in a few districts. Neighbors came to the farm in the afternoon and chopped and split long piles of wood. Then they enjoyed a roast turkey supper, after which the living room was cleared for square dancing. Apple butter bees, quilting bees, butchering, and other informal neighborly cooperation are still popular in some districts but are far less common than before 1900. A survey of the social activities of farm families in the Crooked Creek area of Indiana and Armstrong counties made in 1936 revealed that the principal diversions of rural people were:[9]

	Men, per cent	*Women, per cent*
Visiting	61.2	74.4
Home entertainment	51.5	65.5
Church entertainment	67.3	72.4
School entertainment	44.	52.7
Picnics	62.4	62.9
Holiday celebrations	57.4	56.7
Quiltings		22.4

Various types of festivals and parties in which the objective is wholly social provide diversion in every rural community. From 1850 until about 1900, the Strawberry Festival was in vogue. It was commonly held at the church or school on a warm June evening. The grounds were adorned with gaily-colored Japanese lanterns strung on wires stretched between trees—beautiful when lighted but causing excitement when the wind blew and they caught on fire. The men set up long tables and benches and turned the handles of ice cream freezers; the women capped the strawberries and served tremendous helpings of them with ice cream and cake; the children hung around waiting for an opportunity to lick the blades of the ice cream freezer to which some of the delectable refreshment clung. Harvest Home festivals or picnics, graced by imposing rows of pumpkin and apple pies and gallons of sweet cider, have been a popular rural social diversion for many years. About 1890, oyster suppers in winter, followed by square dancing, drew country youth like a magnet.

Among neighborhood social occasions held in homes, none was more popular among young people than those commonly designated as "kissing parties"—games in which either the penalty or the reward was a kiss. Young married couples and jolly older folks often joined in the fun. Sometimes the games were accompanied by a fiddle, but more commonly time was marked by clapping hands and stamping feet:

Needle's eye, as I supply
The thread that runs so truly,
Many a lass have I let pass
Because I wanted you.

After the games, refreshments were served—doughnuts, baked beans, ginger bread, cake, home-made ice cream, sweet cider. Perhaps there was a candy-pull of home-made molasses taffy. The party over, sled or sleigh loads of young couples drove home under the paling stars, the girls snuggled beneath buffalo robes with their feet on hot soapstones, singing "Jingle Bells" and other rollicking songs to the accompaniment of sleigh bells.

Until about 1890, the community singing school was a social event of the first order. So was the spelling match at the district school; the parents came out to it in force and the best spellers ranged themselves on opposite sides of the room as sides were chosen. The "little red schoolhouse" was the scene of many a program of recitations, dialogues, and debates on the last day of school. The debates were likely to be on such portentious questions as "Which is the greater evil, slavery or intemperance?" or "Which is mightier, the sword or the pen?"

"Literary Night" at the district school was a gala occasion. About 1896, the program might include a parody of a famous school day ditty:

Mary had a little lamb
She loved it every minute.
She used to comb and card the wool
Because she thought she'd spin it.
But Cleveland took the tariff off
And so she had to skin it.

If the neighborhood was predominantly Republican, this rhyme was greeted with uproarious applause. A soulful rendition of "Curfew Shall Not Ring Tonight" or "Bingen on the Rhine" brought the audience near to tears. The homeliest girl in the room recited defiantly, "The Lips That Touch Liquor Shall Never Touch Mine." The program might close with a debate on "*Resolved:* That our nation will crumble and fall as did ancient Rome." After the last thrilling word had been spoken and the bustle of departure was at hand, the young men stood outside the door and bashfully asked the fair ones of their choice as they emerged, "May I see you home?"

Church, school, Grange, and community picnics were the scene of much enjoyment, prodigious eating, and spectacular feats of athletic skill. Most picnics were for a day or afternoon, as on the Fourth of July, but some extended for several days and rivalled county fairs in interest. Such was the Grange Picnic and Encampment, later called the Grangers' Interstate Picnic and Exhibition, which was held annually at Williams' Grove, near Mechanicsburg, Cumberland County, from 1874 until 1915. Some years more than 50,000 people were present to listen to the addresses, inspect the exhibits, enjoy the entertainment, and meet friends from far and near. The picnic of 1887 was described by the Harrisburg *Patriot:* "There were forty thousand people on one day on forty acres of land, the biggest similar gathering of farmers in the United States. . . . On the great Thursday one sees nothing but the crowd, the dust beneath his feet and the tall trees overhead. The $2,000,000 worth of farm machinery and the exhibits of cereals, cattle, hogs, horses and domestic articles are under such a cloud of dust that they are passed by almost unnoticed; the farmers have come here earlier in the week to see them. . . . The irresistible fakir is here and is full of business. . . . The lady balloon vendor is here in all her glory. . . . Thousands crowd into the auditorium to hear addresses by the Governor and prominent grangers."[10]

The Grange Encampment at Centre Hall, Centre County, was begun as a one-day basket picnic in 1874 with no exhibits. By 1915 it had developed into a ten-day event with exhibits, entertainment, and political speeches. Farm families from all over central Pennsylvania rented the 500 or more tents for the duration. In 1911 more than 300 one-day picnics were sponsored by the Grange alone.

Auctions, sales, or vendues are an important social event in rural Pennsylvania. These combinations of thrift and pleasure commonly are held during the late winter or early spring, sometimes in the autumn. Few farmers miss the opportunity to attend a sale even when they have no thought of buying anything. Rural school teachers often find it expedient to dismiss their pupils when a sale is advertised in the neighborhood. A vendue is made necessary by death, retirement, mortgage debt, or removal to a new location. The sum realized for articles sold usually is fully as much as they were worth. Until recent years refreshments were provided, sometimes for several hundred people.

The somber aspects of a vendue were noted by Cornelius Weygandt: "It was pathetic to see a melodeon go for a like [small] sum. It was, perhaps, not in the best of condition, but when one thought of the family gatherings at which it had been played, the hymns and old songs in 'Deitsch' and in English that had been sung to it, how intimately it had been of the very center of the life of the family, it had seemed better it had been burned with the trash than sold for a song. . . . The dismantled house and dooryard cluttered up with household gear, the people tramping out the dooryard grass. . . . To-night the barn would be empty of beasts and the house empty of folks. Only the wind would be moving on the hilltop, . . . unless a deserted cat would prowl in the darkness, and howl for the food that had never before been denied any living thing about this homestead."[11]

Games most popular at parties of rural youth about 1840 were *plumsack*, in which the beau was lightly chastised by his sweetheart, and Blind Man's Buff, in which "Love gropes with bandaged eyes." Other popular games were Drop-the-Handkerchief and Button! Button! Who's-Got-the-Button? The penalty for ineptness—often premeditated—in these and other games was a kiss. Coon hunts on frosty, moonlight nights in autumn were a pleasurable out-of-door pastime for youth of both sexes. Country boys and girls were not immune to the croquet craze which swept across America about 1870 or to the bicycle craze of the nineties, which was equally virulent. By far the most popular out-of-door diversion, however, especially with courting couples, was buggy and sleigh rides. Baseball began to establish itself as the national game about 1865. For a number of years it was wholly amateur; every school and rural village had its nine.

MUSIC AND DANCING

Vocal and instrumental music have entered largely into the pattern of rural life. Prior to 1900, no family or public gathering, no church, school, or community entertainment would have been complete without group singing of sacred music and folk songs. In the Allegheny Mountains, especially, many of the ballads, folk songs, nursery, and counting-out rhymes and legends of Scotland and England were kept alive from generation to generation by word of mouth; some of these are being re-discovered in our day. Stephen Foster (1826-1864), who was born in Allegheny County, was the most beloved folk-song writer of America; his "Old Folks at Home," "My Old Kentucky Home," "Old Black Joe," "Old Dog Tray," and "Come Where My Love Lies Dreaming" are as universal in their appeal as "Annie Laurie" and "Loch Lomond."

The country singing school of 1840 to 1890 was a notable community social event. A Westmoreland County farmer, John R. Steele, recalls his participation in one about 1880: "After the chores were done and we had lapped our supper of mush and milk, we dressed in our coarse, warm clothes and listened for the sound of bells; then we hastened to pile into the first neighbor's sled that was bound for the schoolhouse. The schoolhouse was packed from corner to corner. The whole neighborhood, old and young, was there. We always began by singing 'Greeting Glee.' It was followed by 'Over the Tide of That Jasper Sea,' 'They That Trust in the Lord,' 'Summer's Going,' 'Nearer Home,' 'Serenade,' 'Merry May,' and many others. . . . We always closed with 'Goodnight.' Then teams were unblanketed and we started home singing all the way. My brother and I went upstairs by the light of a grease lamp and tumbled into bed in a fireless room of the old log house."[12] Perhaps in their dreams they still heard the admonition of the singing master:

> "Hear, my young friends, observe there are
> But two beats-measure to the bar."
> Again the tuning fork goes *ding!*
> "Now, all be careful: One, two,—sing!"

Sunday evening singing by Amish young people still is popular, especially with courting couples. Says Walter Kollmorgen, "Usually they go to a designated place where young people assemble to pair off. The village of Intercourse, centrally located in the large Old Order community, is the place. . . . By 8 o'clock most of them are again on the road, headed for the singing with their chosen partners. In the house of the host, they gather around a table to sing church hymns, '*einstimmig.*' Singing is often interspersed with riddles or conundrums. Refreshments are always served. Everyone is expected to leave for home before midnight."[13] In recent years singing schools and community singing have been almost wholly superseded by public school singing. During World War I (1917-1918) there was a brief revival of community singing, mostly of such haunting war-time melodies as "Keep the Home Fires Burning," "There's a Long, Long Trail a-Winding," and "Over There."

In 1931 and again in 1934, the State Potato Growers' Association sponsored a Rural Choir Contest at The Pennsylvania State College; this became part of the program of the annual Farmers' Day at the

College. The seventh such contest was held in 1939. Choruses of not fewer than eight voices represented Grange, Churches, and other community organizations. The finals of the fifth Grange Group Music Festival were held in 1940 at the annual meeting of the State Grange, following preliminary competition between subordinate and Pomona Granges.

Instrumental music has supplemented singing, especially in rural homes. A stringed musical instrument called the *zitter*, which somewhat resembles a zither, was popular among Pennsylvania Germans until about 1870; it was used to accompany hymn singing in the home. In 1888 it was reported, "In our own county [Lebanon] there are no less than nine hundred Miller organs, besides about four hundred pianos, . . . mostly through the county . . . There is not a village, however small, but on stated evenings they [boys] can be seen trodding along in all kinds of weather, walking for miles after a hard day's work, going to [band or orchestra] rehearsal . . . Two hundred of [the 300 members of the fifteen bands in the county] are the boys from the country."[14] The era of community brass bands and open-air band concerts on Saturday nights passed about 1910; thereafter band music in the country was mostly in connection with the public schools.

The Industrial Revolution radically changed the character of rural entertainment. With the passing of the singing school, frolics, and bees, folk songs that were hallowed by time began to lose favor, especially among young people, and "popular music" came into vogue. Before 1900 most of this had a thick vein of melodrama and sentimentality, as "The Picture That Is Turned Toward the Wall" (1891), "After the Ball Is Over" (1892), and "My Mother Was a Lady" (1896). Most of the popular songs and "hits" of these and later years had a brief rage and were soon forgotten, to be succeeded by others equally ephemeral. They were evidence of a sad deterioration in musical taste as compared with the days when songs that endure, as those by Stephen Foster, and sacred music, were known and sung by all.

About 1916, "jazz," which originally was negro music set to dance time, captured the popular fancy only to be succeeded by "swing" and other barbaric types of music which depend largely on their special rhythm for appeal. The advent of the phonograph and radio provided "canned music" and tended to check the personal expression of musical ability by amateurs; it was easier to listen to professionals.

Except among strict religious sects, dancing has been one of the most popular rural diversions. In the early days, dancing was mostly in the home or on the barn floor. Young people would gather late in the afternoon at some hospitable home; the boys would saw and split wood while the girls busied themselves in the house preparing supper. After supper, the living room was cleared and square dancing ensued to the accompaniment of a fiddle, but often time was marked by clapping hands and stamping feet. The stentorian voice of the caller indicated the different figures:

> Single style, Indian style,
> Stop and swing her once in a while.
> Off to the right with a dish rag wring,
> Then to the left with a bear hug swing.
> Now the oyster, now the clam,
> Dance that girl to fairyland.

Fiddlers were a jovial lot. They might have fortified themselves for the long ordeal with stimulants until they could hardly stick in their chairs. With great abandon they played "Turkey in the Straw," "Money Musk," "Virginia Reel," "Sourwood Mountain," "Cluck Old Hen," "Napoleon's March," "John Anderson," "The Girl I Left Behind Me," "The Devil's Dream," "French Four," "Pine Creek Lady," and other rollicking tunes which set feet to dancing or to tapping the floor. During the winter, dances were commonly held on Saturday night. Always, at the stroke of twelve, "Home, Sweet Home" was played; no one would be so wicked as to dance on Sunday.

Soon after World War I, rural young people began to abandon other amusements and devote the entire evening to dancing. The waltz and other graceful round dances were largely superseded by the "Bunny Hug," "Turkey Trot," and other grotesque gyrations. Jazz spread with the new dances. The dance hall and road house began to invade the countryside. In 1918, *Pennsylvania Grange News* stated, "Dancing in Grange Halls or in connection with the Grange has been the leading cause of disrupting many Granges in Pennsylvania." In the early days of radio, barn dances by radio music were popular with rural young people who still enjoyed the old-fashioned square dances.

DRAMA AND MOVIES

The drama and musical comedy have contributed largely to rural entertainment, especially since 1900. After 1855, dramatic versions of Harriet Beecher Stowe's "Uncle Tom's Cabin" and T. S. Arthur's "Ten Nights in a Barroom" toured the State. These two plays helped break down the prejudice of many deeply religious people against the drama. Washington Irving's "Rip Van Winkle" also was a favorite. Some of the traveling shows that appeared in rural districts had very poor casts. In 1890 an editor of a country newspaper sourly commented, "An Uncle Tom's Cabin company gave a show here last night. The dogs were poorly supported." Gilbert and Sullivan's sparkling musical comedy entertained many a rural audience after 1880. After 1890, the black-face minstrel show, sparked by "Sambo" and "Bones," began to lose its appeal. It was succeeded for a brief period by variety shows and ultimately by the movies.

After 1920, the interest of rural people in amateur dramatics and pageants was intensified. In 1930 it was reported, "For years the community clubs and especially the Granges, of Chester County, Pennsylvania, have encouraged dramatics. . . . This last season, 1929-1930, twenty active player groups took part in a year-round county program."[15] In 1931-1932, forty-one counties had amateur dramatics teams which represented Granges, Literary Societies, Parent-Teachers' Associations, churches, and other rural organizations. Winners in county and district competition were entered in the State-wide contest held at the Farm Show. The Sixth Annual State Rural Music and Dramatic Tournament was held in 1936. The music groups included male quartets, stringed bands, women's glee clubs, orchestras, and mixed choruses. Forty-two counties were represented in the one-act play contest. After 1935, numerous county Rural Talent Festivals, which included one-act plays, music, folk games, and pageants, were held under the auspices of County Agricultural Extension Associations. Several hundred farm people participated in the annual pageant at the Farm Show.

With the opening of the twentieth century, three new types of entertainment—the movie, phonograph, and radio—began to supplement and eventually almost to supplant those that had prevailed hitherto, except dancing. In 1889, the kinetoscope was invented by Thomas A. Edison, and in 1896 the Edison Company presented the first silent moving picture in a theater. In 1908, moving picture theaters were common in cities, but there were few in rural towns until after 1910. By 1920, more than half the movie theaters in Pennsylvania were in towns of less than 5,000; only the most remote rural districts were without them. Mary Pickford became "America's Sweetheart" and Charles Chaplin made the nation rock with laughter at his slap-stick comedy.

Many of the older generation did not welcome this innovation. In 1914 the editor of *Pennsylvania Farmer* warned, "Moving picture shows are a menace to society. There is scarcely a country town that has not one or more of them. They are cheap—only five or ten cents a show. For young people the movies must be classed with cheap, trashy literature and even more dangerous allurements. The wise parent will place moving pictures as one of the most serious menaces to the proper development of the child." With the advent of sound movies and colored film, attendance mounted. By 1940 the movie had become the most popular amusement of rural young people, next to dancing, even though most of the films were concerned with sex, thrills, and glamorized urban life. On the other hand, moving pictures were used more and more by schools, churches, and other agencies as means of propaganda and education as well as entertainment.

The first "talking machine" was made by Thomas A. Edison in 1877. By 1910, Victor Talking Machines with huge loud speakers were found in many farm homes; their trademark was a dog listening to "His Master's Voice." Other commercial forms of this invention were known as phonographs or graphophones. By 1925, phonograph records had largely supplanted the fiddler for providing dance music. Dust began to gather on melodeons and pianos in many farm homes; they became only pieces of antique furniture.

"Wireless telegraphy" was patented on June 2, 1896, by Guglielmo Marconi of Italy. The first radio broadcasting station in the world was KDKA at Pittsburgh. On November 2, 1920, the Westinghouse Electrical and Manufacturing Company of that city began to broadcast programs daily. On August 6, 1921, *National Stockman and Farmer* announced, "This week we carry an advertisement which is the first of its kind ever to appear in an agricultural journal. The wireless telephone will some day be as common in farm homes as other modern conveniences are now." This prophecy has been abundantly fulfilled.

In 1923, wave lengths were assigned to different transmitting stations. In 1924, there were 10,378 receiving sets in Pennsylvania farm homes; many were home-made crystal sets which were sorely afflicted with static. In 1927 the number had increased to 34,000 and it was stated, "No invention in recent years, not even the automobile, has increased in popularity among farmers in the Commonwealth of Pennsylvania so rapidly as the radio."[16] By 1940, more than half of the farms had radio sets, some in barns as well as houses.

The popularity of radio among farmers was due as much to the entertainment that it provided for all the family as to its usefulness as a source of information on weather, markets, political happenings, and news of the world. In 1920, KDKA began to transmit musical programs; by 1925, a varied program of music, drama, comedy, and other entertainment was available to rural people throughout the day, together with adult educational and cultural features. This was made possible by "commercials," the advertisements of business firms that had tooth paste, cigarettes, motor fuel, patent medicines, and a multitude of other articles or services to sell; these were interspersed with the entertainment and educational program. The farmer could sit in his easy chair after supper and hear the news of the world and happenings at the nation's capital. His wife could listen to music and entertainment and to local news while doing her household tasks. His children could listen to their favorite programs of juvenile entertainment—which also advertised the merits of certain breakfast foods. The radio removed the barrier of space that had separated farm homes from the world at large. In 1940, television, in which the characters on the air could be seen as well as heard, was a decade away.

PUBLIC OCCASIONS

The old-time Fourth of July was a red letter day for rural people. The Brookville *Backwoodsman* described the local celebration of 1843: "The glorious day was ushered in by the firing of cannons and the ringing of bells. At an early hour the Independent Greens marched through the streets to the cheers of the large body of spectators. . . . Following the parade the Declaration of Independence was read at The Court House in a clear and impressive tone after which David S. Deering, Esq., delivered an eloquent address appropriate to the occasion. . . . The company then formed into line and proceeded to the hotel where it sat down to a well-served, delicious and bountiful repast. The ladies formed a smiling and interesting platoon on one side of the table and added much to the hilarity of the occasion. After the cloth was removed a number of toasts applicable to the times, (fourteen, to be exact) were offered, accompanied by repeated cheering and a variety of airs from the brass band, thus passing the day in that union and harmony so characteristic of Americans."[17] Small boys had an estatic time with cap pistols, firecrackers, and other noise producers; at night rockets, Roman candles, and other pyrotechnic displays blazed across the sky.

The circus has charmed rural Pennsylvania for several generations. Until about 1860, small troupes traveled the dusty country roads of midsummer for one-night stands in rural towns. About 1855, "Barnum's Grand Colossal Museum and Menagerie" began to entrance multitudes; a steam calliope heralded the opening of "the greatest show on earth." In 1881 the two leading circus magnates, P. T. Barnum and J. A. Bailey, combined their shows into a spectacle that had no rival at that time. The superlatives of the English language and the fervid imagination of artists were exhausted in an attempt to portray on florid colored posters the glories of this event. The great elephant, Jumbo, was secured from the Royal Zoological Gardens, England; it was a lodestone that drew rural youth to the show.

Under the "Big Top," clowns, slap-stick artists, acrobats, and trained animals held the crowd spell-bound. Prodigious quantities of peanuts were consumed at five cents a bag.

From 1850 until 1880, balloon ascensions were an exciting event at county and state fairs. John Wise of Lancaster modestly described himself as "the world-renowned aeronaut who has made more voyages through the Heavens than any other man." Sometimes more than 20,000 people paid a dollar each to see his daring flights.

In addition to the Glorious Fourth and circus day, county fairs were outstanding rural holidays. Some communities had an annual Old Settlers' Day which was devoted to speeches extolling the good old days, horse shoe pitching, athletic contests, and fried chicken dinners.

Grange, church, and community picnics enlivened the summer months. One country editor wrote disparagingly of "the big picnic dinner that takes a day to prepare, a day to eat and a day to recover from. This back-breaking, stomach-wrecking institution belongs to the past when people could take a lot of punishment." He found himself in a hopeless minority. There was considerable fighting at fairs, dances, camp meetings, and other public occasions; men were prone to drink, and discussions of politics waxed hot.

Numerous contests of skill—athletics, turkey shoots, and the like—added zest to public occasions. Wagers were laid on the slightest provocation. The diary of Robert Cooper, a Venango County farmer, contained this item in 1853: "Dr. J. W. Orwig bet that he could suck forty-eight hen eggs at one time. I stood him five dollars. The doctor sucked the forty-eight eggs and won the money." Until about 1900, old fiddler contests were popular; the contestants were sixty to eighty years old. Competitive grain-reaping contests attracted great crowds; band music and refreshments, liquid and solid, enhanced the enjoyment of the contests in midsummer heat.

Neighborhood corn husking contests have been a popular rural diversion since colonial days. The second annual county-wide contest of York County was held October 31, 1935, under the auspices of the County Agricultural Extension Association. Husking was from shocked corn. *Pennsylvania Farmer* reported that there were sixty-five contestants and 1,500 spectators. At 10 A. M. each contestant husked for five minutes. The twenty best were entered in the finals which began at 1:00 P. M. and they husked for eighty minutes. Stanley Yeager was champion; he husked 22.34 bushels of seventy pounds each.[18]

The first unofficial State-wide corn husking contest from shocks was held at York, November 6, 1937.[19] The first official State-wide contest, which was sponsored by *Pennsylvania Farmer,* was held on October 26, 1938, in Lancaster County. The corn was husked from standing stalks under the rules of the National Corn Husking Contest. Prior to the State contest county contests were held. Several thousand men watched eighteen men battle for supremacy. The winner, a York County farmer, husked 25.16 bushels in eighty minutes. The winner of the 1940 State-wide contest husked 30.27 bushels from standing corn in eighty minutes before 7,000 spectators.

Horseshoe pitching or "barnyard golf" has been a favorite sport among Pennsylvania farmers for more than a century. In 1931 it was reported, "Nearly every county in the state will have a county-wide tournament this year. Preliminary to the county contest local contests are held at picnics, field days, fairs and other rural gatherings. Interest is running high and eager eyes are turned toward county championships and the state championship." In 1938, John Fulton of Cumberland County won the State championship at the Farm Show; he pitched fifty-eight ringers out of 100 throws.

COMMUNICATION

The isolation that characterized rural life before 1900 was largely removed by the telephone (1895), Rural Free Delivery (1900), automobile (1912), parcels post (1913), good roads (beginning about 1914), and the radio (1920). These obliterated the miles that formerly separated town from country; no longer are rural people set apart from the rest of the world. They brought evils as well as blessings into country life, but on the whole they have been salutary. In 1900 it was seriously proposed by one economist that the problem of rural isolation be met by gathering farmers into villages, as in Europe. This wildly impracticable scheme met the cool reception that it deserved.

Improvements in mail service have been an important factor in the betterment of rural life. In 1850, letter postage, which had been exorbitant, was reduced to three cents to all points less than 3,000 miles distant. In 1885 the rate became two cents an ounce to any point in the United States or Canada. This greatly stimulated rural letter writing. Most Amish, who do not marry outside the sect, have the same family names as the first immigrants of their faith from Europe, two centuries ago—Yoder, Zug, Lapp, Koenig, Beiler, Glick, Fischer, Blank, Erb, Kauffman, Schmucher, Peterscheim, and Stoltzfus. There may be a dozen men named Joseph Stoltzfus on one mail route in an Amish community; hence there is much confusion in delivery of mail. To meet this problem some Amish have adopted nicknames; one is known as "Two-miles-from-White-Horse Henner Yoder."

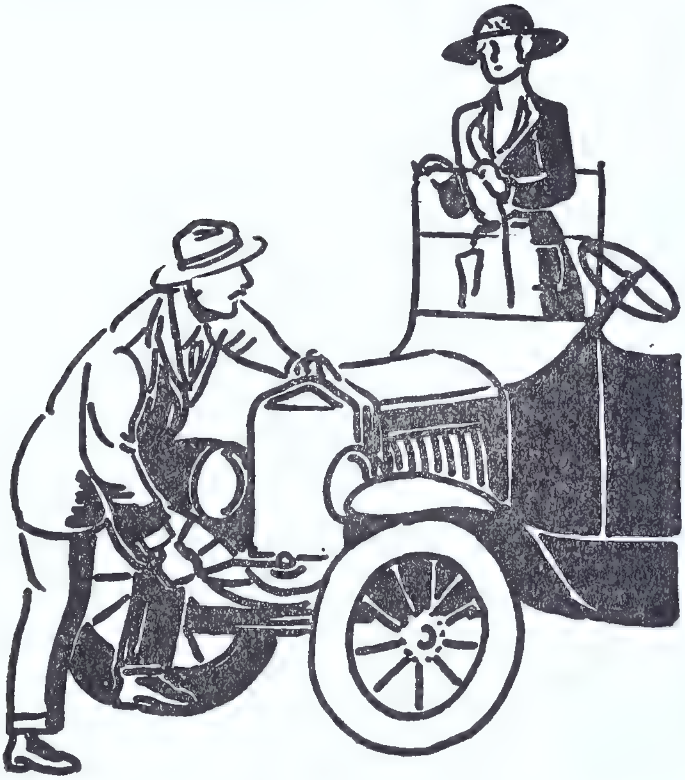
In 1891 Postmaster-General John Wanamaker of Philadelphia recommended Rural Free Delivery of mail; but not until 1896 were the first trial routes established. The National Grange was active in securing passage of the enabling Act. In November, 1896, four experimental routes were established in Pennsylvania, two out of Lancaster, one out of Ruffsdale, Westmoreland County, and one out of New Stanton in the same county. The office of the Postmaster-General reported, "The rural carriers performed their services on horseback, or riding in buckboards, buggies, two-wheeled carts or on bicycles. . . . There has been . . . a hesitation on the part of the community to break in upon their long-established custom of riding to town for their mails."[20]

In some parts of the country farmers were opposed to RFD. In 1896 the United States Department of Agriculture stated: "The argument has been advanced by farmers themselves at Farmers' Institutes that it is out of the question to have a general free delivery in country districts. Farmers have not asked for this service nor do they believe that it is practicable because of the expense involved."[21] Pennsylvania farmers, however, warmly supported the movement. According to the Postmaster-General's office, "The service [in Lancaster County] was popular from the start and soon resulted in a large increase in the number of letters and newspapers carried. . . . Within a short time after the establishment of the service [in Westmoreland County] the number of pieces of mail carried was doubled."[22] The service was extended gradually throughout the State; by 1924 there were 2,036 routes covering an aggregate distance of 53,385 miles.

At first some rural mail carriers did business on the side; they were in effect, traveling business agents or peddlers. In 1904 the federal government increased their pay and stipulated that carriers should have no other vocation. Considerable opposition to RFD developed among local merchants whose business was hurt because of farmer trade with mail order houses. In 1926, RFD carriers who formerly had covered their routes in four or five hours with horse and buggy did so in one or two hours with an automobile. By 1940, RFD served practically every rural family. Among other benefits, it enabled farmers to take daily papers; on one route the number increased from thirteen to 113 in three years.

Parcels Post was inaugurated January 1, 1913, against the strenuous opposition of express companies and country storekeepers. The National Grange strongly supported the measure. In 1910 a Bradford County farmer said, "The means of communication of greatest importance to the farmer at the present time would be obtained by the establishment of the parcels post." The express companies and country merchants opposed it, he said, the latter on the ground that they could not compete with the great mail order houses of the cities. "Just so long as we permit corporate interests to dominate this question just so long will we do without this needed reform."[23] At first it was thought that Parcels Post would promote direct-to-consumer marketing of farm produce, but little of this developed. The chief advantage was cheaper buying from a larger selection of certain farm and household articles. After Parcels Post was established, mail-order catalogs were found in nearly all farm homes; they were the twentieth-century successor to the Yankee peddler of the nineteenth century.

Horse-and-buggy days ended for many farmers about 1912, when cheap and efficient automobiles became available. In his father's day, said a Lycoming County farmer, in 1900, "All rode on horseback. There were no wagons for pleasure; even in 1855 there were no covered wagons in the prosperous Lycoming Creek valley."[24] Soon thereafter horse-drawn vehicles—buggies, carriages, surreys, and buckboards—were the almost exclusive method of travel throughout the



Cranking the "fliver," 1916

State until displaced by the automobile about 1912. The Old Order Amish, however, still live in horse-and-buggy days. Traveling along modern concrete or macadam highways in their little top buggies—all built and most of them painted alike,—they are a picturesque anachronism, a glimpse of an era that has long since passed away. In this, as in many other respects, the Amish have remained singularly aloof from the mainstream of life.

Few farm youth were caught up in the bicycle craze of the 1890's. When automobiles first appeared on the highways, most rural people fought them as they would the devil in person. Some aroused farmers whose teams had been stampeded by the noisy contraptions urged the use of pitchforks to keep the country roads clear of them. In 1903 the General Assembly set the speed limit at twenty miles an hour, and the driver was required to stop his car and pull to the side of the road when signalled by the driver of a horse-drawn vehicle.

Not until after 1910 did automobiles begin to commend themselves to farmers to any considerable extent. In 1914, only seven per cent of Pennsylvania farmers owned automobiles; in 1921, the percentage had risen to seventy-two. By 1940, practically every farmer had at least one car.

The automobile revolutionized country life. It enabled the farmer to trade at points twenty-five or more miles away, thus causing the country store, once a business and social center of great significance, to languish. It enabled him to mingle freely with people in near-by towns and cities, to send his children to consolidated schools, and to make vacation trips to distant points. It was a potent social as well as economic force in rural life. Henry Ford's famous Model T, a cheap but serviceable little car, was preeminently the farmers' automobile; for years more were sold than all other cars combined. Although the butt of a thousand jokes, the "flivver" or "tin Lizzie" made history. It contributed more to the transformation of country life than any other single factor. It was taken out of production in 1927.

Alexander Graham Bell first exhibited his telephone at the Centennial Exposition at Philadelphia in 1876, but the public did not take it seriously for many years thereafter. Western Union dubbed it a "scientific toy." Until after 1890, the telephone was a convenience of the city; its cost to the farmer was prohibitive. There were, however, a few short private lines in the country. In 1883, a Susquehanna County farmer reported, "One of my neighbors, who lives distant one half mile, and myself, have made telephone connection between our houses. We use small copper wire, with the simple telephone, using no electricity. The cost to us was less than five dollars. With it we can converse at nearly all times."[25]

After 1893, when the monopoly of the Bell Telephone Company expired, independent mutual lines were built by farmers. For many years the Bell Telephone Company refused to connect with independent lines; this only contributed to their growth. One of the largest farmers' mutual telephone companies in the United States was that at Canonsburg; in 1905 it served 1,030 farms. In 1910, a Bradford County farmer told of the growth of a local cooperative telephone line: "Farmers were allowed to furnish poles or work in part payment for their stock, and no man was allowed to own more than three shares of stock . . . At the present time this company [has] 1,200 stockholders, with half as many renters, and owns about 2,000 miles of wire. There is scarcely a farm in the region but can be reached by 'phone. The expense . . ., to stockholders owning their own 'phones, is $4.00 a year."[26]

The telephone was a major means of alleviating the isolation of country life. There was some friction at first because curiosity led many farm people to listen to the conversation of others on the same line. There was much visiting on the telephone among neighbors, especially women. In time of emergency the telephone was especially useful. Weather predictions and market reports were sent out over the telephone before the radio was available. It facilitated business transactions. By 1940, about half of Pennsylvania farm homes had telephones.

Old Order Amish did not permit them to be installed in their homes because they are "worldly" and "tempt the women to waste their time talking to their neighbors." Pay telephone stations, however, were located throughout Amish communities.

The epic flight of Charles Lindbergh across the Atlantic from New York to Paris in 1927 was dramatic evidence that the air age had begun. By 1940, aviation was an established commercial industry but had not yet entered largely into country life, although there were a few "flying farmers," pioneers in what may become a common mode of transportation in the future.

Easier and cheaper transportation and increasing agricultural prosperity made it possible for farmers and their families to take more vacation trips. Before 1840, few farmers traveled beyond the boundaries of their own county; by 1940, there were few who had not visited some distant points of interest, perhaps several thousand miles away. Between 1850 and 1910, travel was mostly by rail, with brass-studded horse-hide trunks handed down from stage coach days. A honeymoon at Niagara Falls was the fond dream of every prospective bride and groom; they were thrilled when the "Maid of the Mist" carried them to the very vortex of the Falls. Many Pennsylvania farmers traveled by rail to the Centennial Exposition at Philadelphia in 1876 and to the World's Columbian Exposition at Chicago in 1892, where the white splendor of the "Court of Honor," with its splashing fountains and lagoons of placid water, was a dream of loveliness. After 1912, farm-family vacation trips were mostly by automobile; "tin can tourists" sleeping in tents attached to the car were a common sight in national parks three thousand miles away. By 1918, family and group automobile tours were common; they helped to broaden the horizon of rural people.

THE CHANGING RURAL SCENE

It was inevitable that as the country became more and more urbanized some of the disadvantages as well as the benefits of urban life should creep in. Most farmers observe Sunday in accord with the spiritual injunction. In 1933, against practically united opposition from rural districts, the Blue Laws of the State were amended for the first time since they were passed in 1794; commercial baseball and football games were permitted in districts which voted in favor of this action at a regular election. This was the opening wedge; Sunday movies, golf, and other diversions followed. The lax Sunday of continental Europe began to prevail to a considerable extent in rural as well as urban America.

By Act of General Assembly in 1905, the Pennsylvania State Constabulary or State Police was organized, primarily to maintain law and order in rural districts. In 1923, the State Highway Patrol was combined with it. The service rendered by the State Police has been outstanding; it has greatly added to the security of rural life. In 1940 there were 1,408 State Police stationed at 117 points; practically all counties had at least one. They covered a certain territory on a regular schedule and were available on call in time of emergency.

After 1870, the great natural beauty of the Pennsylvania countryside began to be marred by commercial advertising, especially billboards and signs painted on farm buildings. Much of the abatement of this objectionable feature is in the hands of farmers on whose property many of the signs are placed. The paltry recompense that they receive from the advertising agency is insignificant as compared with the beauty that is destroyed. Efforts to persuade the General Assembly to prohibit or regulate this nuisance, as is done in several other states, have thus far been without avail. Ogden Nash's paraphrase of the immortal poem of Joyce Kilmer contains more truth than poetry:

> I think that I shall never see
> A billboard lovely as a tree.
> Indeed, unless the billboards fall
> I'll never see a tree at all.

In recent years the State Department of Highways has adorned many miles of roadside with shrubbery, flowers, and small flowering trees. An Act of General Assembly of 1879 provided: "Any person liable to road tax, who shall transplant to the side of the public highway, on his own premises, any fruit, shade trees or forest trees, of suitable size, shall be allowed . . . in abatement of his road tax, one dollar for every four trees set out."[27] After 1900, the planting of shade trees along rural highways was discontinued because they interfere with telephone and electric service, rob crops in adjacent fields, and tend to keep the road in poor condition, especially in winter.

The constantly increasing number of contacts between country and town people in churches, schools, service clubs, and other community activities has tended to develop a spirit of unity. In 1824 it was reported, "During the summer the business men of Lock Haven and the farmers of Clinton Coounty visit various types of farms throughout the County and then have a corn roast and picnic supper together. During the winter the townmen act as hosts to the farmers who visit the largest centers of business in the city. The result has been a closer acquaintance and deeper confidence between the two groups." In the same year: "Before 12,000 people attending the annual Susquehanna Valley Farmers' Picnic at Sunbury, August 13, 1924, twenty-four farmers upheld the reputation of rural people as expert horseshoe pitchers by defeating twenty-four business men. The score was 604 to 293." Business men in many urban service clubs take an active interest in, and often extend financial aid to, the Agricultural Extension program, especially the club work of rural boys and girls.

As a whole, country life is much more attractive than it was a generation ago; but some of the admirable features of rural life in former years have been lost. This is especially true in districts that have been "blighted" by urban or industrial development. According to William V. Dennis, "The increased mobility of the farm population has been both a benefit and a misfortune, oftentimes weakening the social structure of the community, while it broadens the horizons of the individual farmers."[28]

In 1929, a Venango County farmer, O. C. Sigworth, spoke eloquently of the degeneration of rural life in certain parts of that county resulting from the invasion of industry: "Our township," he wrote, "is strictly a rural community, six to twelve miles from Franklin and fifteen from Oil City. Twenty years ago . . . we had a going Grange of 150 members. There were six churches of four denominations and nine schools.

"Our social activities were somewhat crude—we had log-rollings, stone haulings, wood choppings. The Grange Hall was a center for dancing, festivals, entertainments, etc. Our young people piled in sleds and with bells jingling, what a merry ride to some neighbor's for a party, a taffy-pull or play, and we fathers and mothers could shake a leg or play 'The Bear Went Over the Mountains' with the best of them. We had spelling bees, Lyceums, oyster suppers, etc., attended by everybody from six months old to octogenarians.

"We lived mostly from the products of our farms. She was a poor housewife who did not have enough fruits, jellies, and preserves, etc., to open a can every day of the dormant season and the odor of bread baking and apple butter boiling was abroad in the land.

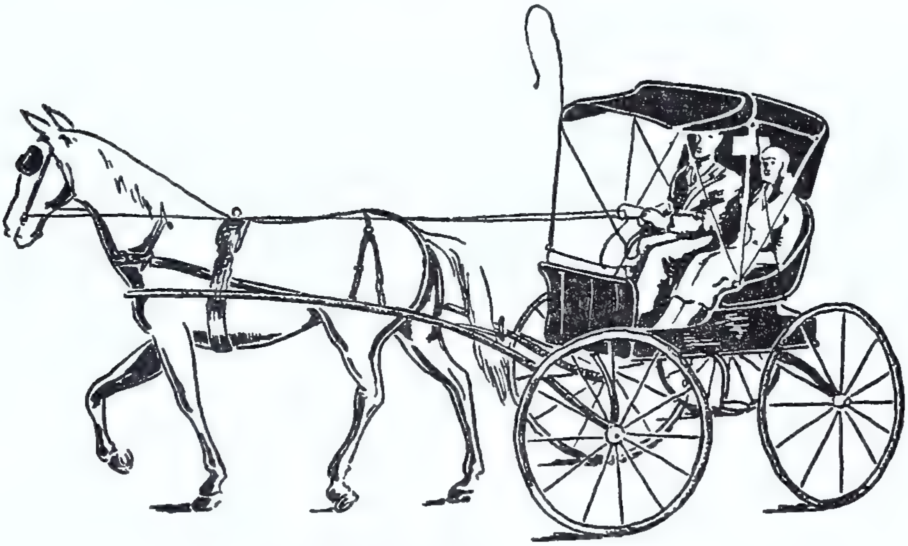
". . . But prosperity struck us a solar plexus blow. Franklin woke from a sleepy county seat . . . to a first-rate industrial center . . . Oil City became the center of Standard Oil activities . . . Our boys left the farms and flocked to the cities . . .

"Our Grange is innocuous desuetude. Our churches, except one, are pastorless . . . Our social activities are nil . . .

". . . The housewife buys bread and canned goods at the grocery and motors to the movies The husband migrates back and forth to the shop. The family keeps a pig, a cow and some hens and raises a few spuds . . . Our small hill-side farms will be no more profitable."[29] This gloomy picture is representative of many other parts of the State where industry has blighted agriculture.

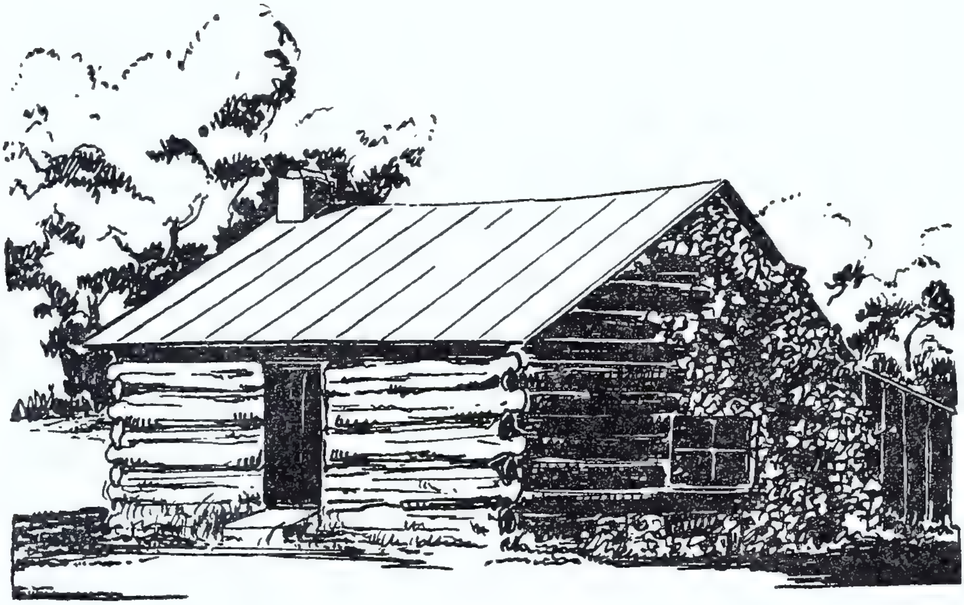
In every generation there are those who sigh for "the good old days" of their youth. In 1855, a Chester County farmer called up nostalgic memories of his boyhood: "Old implements and old customs have been superseded . . . The reapers are not often seen in animated contest gathering the grain in their bosoms. The sound of lusty threshers is rarely noticed beating time upon the hardened ground. The huskers' jolly party of men and damsels are no more heard singing by the moonlight as they strip the yellow corn.—The apple-paring matches and the quilters' pleasant frolics have ceased to cheer the big old fire-place with the jovial airs of the fiddle and the fantastic footsteps of the jig . . . The spinning wheel is seldom whirling its industrious round. The flax pullers no longer ply their merry task—gone are the days of the cocked hat, the buckled small clothes, the ruffled wristbands and the fair topped boots."[30]

Thus does the old give place to the new in every generation, and the new seldom seems good to those who experienced the old in their youth. But no one can turn back the pages of time.



Rural courting couple, 1890

XIX



Log school house, 1840

RURAL SCHOOLS AND CHURCHES

THE IMPACT of an industrialized and urbanized civilization on rural life affected schools and churches as well as farm homes. These primary institutions for the preservation and development of country life have changed with the times fully as much as have the objectives and methods of farming. They still minister to the educational and spiritual needs of rural people, but in ways that were not dreamed of a generation ago.

The Common School System

The long and often bitter controversy over the maintenance of church schools which began in 1834 terminated, for the most part, in 1854. In that year the General Assembly cut off State aid to German church schools and provided legal means for removing from office district school boards that failed to maintain free public schools. In 1868 there still were 213 non-accepting districts with 7,000 pupils. In that year the General Assembly passed an Act under which districts that had refused to accept the School Law of 1834 might receive all the accumulated State appropriations to which they would have been entitled had they accepted it by 1860, provided they established free schools by 1870. By the end of 1870 all non-cooperating districts had swung into line except one in Wyoming County; this did not comply until 1873. In 1874 the State Superintendent was able to report, "For the first time in our history the door of a public schoolhouse stands open to receive every child of proper age within the limits of the state."

The State constitution adopted in 1873 provided, "No money raised for the public schools of the Commonwealth shall be appropriated to or used for the support of any sectarian school." Until about 1890, some district schools in predominantly German-speaking areas were taught in Pennsylvania German. The State made no attempt to train teachers for these schools; hence, ultimately, all rural school boards were forced to employ only English-speaking teachers.

The development of the common school system was slow prior to 1851, which saw the beginning of an educational revival. In that year *Pennsylvania Farm Journal* stated that the agricultural press was the most efficient and legitimate advocate of common school and specific agricultural education; some farm journals had educational departments.[1] The State Teachers' Association was organized in 1851, and publication of *Pennsylvania School Journal* begun. In the same year a minimum school term of four months was established; in 1872 it was increased to five months, and in 1887 to six months. The appointment of county Superintendents of Schools was authorized in 1854; previously each school district had been a law unto itself. The educational revival culminated in 1857, when twelve normal schools for training teachers were established; the first was Millersville Normal. These were private schools which received some State aid; in 1913 they were taken over by the State. In 1857, administration of public schools was removed from the Department of Interior, and a separate Department of Common Schools created. The title was changed to Department of Public Instruction in 1873.

The State constitution of 1873 stipulated, "The General Assembly shall provide for the maintenance and support of a thorough and efficient system of public schools where all children of the Commonwealth above the age of six may be educated; and shall appropriate at least $1,000,000 a year for that purpose." Thereafter the development of the common school system was rapid. In 1893 a law was enacted requiring the provision of free textbooks. By Act of June 28, 1895, township high schools were authorized and State aid for them provided. In the same year, school attendance was made obligatory between the ages of eight and thirteen. By Act of June 22, 1897, school directors were authorized to provide transportation for rural pupils. The first minimum-salary law was passed in 1903; the amount set was $35 a month. In 1921, the minimum school term was extended to eight months.

The Edmonds Act of 1921 was the most important school legislation since the Act of 1834. Although opposed by many farmers and farm organizations, it was a long step in advance. The Act provided higher qualifications for teachers, higher minimum salaries, and more State aid, standardized the curriculum, and authorized consolidation of schools in rural districts. Important developments in recent years include supervision of the health of school children, school libraries, increased State aid to rural schools, higher minimum salaries, and curriculum enrichment, including the establishment of the Bureau of Vocational Education in 1917.

Some opposition to the common school system still persists, especially among the ultra-conservative Amish and other Plain People. Their objections are based on religious grounds; they feel that primary responsibility for the education of the child rests with the parents and the church, not the state; and that public school education tends to draw children away from the farm and from the religious faith of their fathers. In 1937, when the Public Works Administration granted $52,000 toward the construction of a consolidated school in East Lampeter Township, Lancaster County, where many Plain People live, Amish farmers addressed letters of protest to the President of the United States and the Governor of Pennsylvania. Despite their protests, the school was built, whereupon the Amish established church schools which were conducted without State aid. Most Amish have become reconciled to one-room public district schools, but not to consolidated schools or to high schools.

On January 2, 1941, the Old Order Amish and Old Order Mennonites addressed this letter to the General Assembly: "Throughout time past we have chosen and do yet choose, to be a farming people. Farming is one of the tenets of our Religion. We wish to have our children educated by the best available means including Scripture in the home and church three R's in school and actual experienced training under Parental supervision at home and on the farm. To this end, we the Plain Churches petition . . . that children in rural districts be not compelled to attend school beyond a 160 day term . . . that the children of Plain People be granted exemption from school attendance upon request of Parent or Guardian and upon completing primary studies of the elementary grades or after attaining the age of fourteen years we further would desire to have sufficient privileges to establish independent schools where the public school districts determine upon consolidation and transportation."[2] The General Assembly turned a deaf ear to this appeal. In 1939 the White Hall Dutch Schoolhouse near Belleville, Mifflin County, which was built in 1867, was reopened.

Children of the Plain People in the Kishacoquillas Valley went to it on Saturdays to learn reading, writing, spelling, arithmetic, and the Scriptures, and to sing the ancient music of their sect in the language of their forefathers.

It is difficult not to sympathize with these efficient and conscientious tillers of the soil, even though they are trying to maintain an order that has long since become obsolete. They seek to build a religious and social wall around themselves within which to live as their ancestors did centuries ago. The ultimate futility of this policy is evidenced by the attitude of many of their young people.

The Amish and some other farm families of German stock use three languages: Pennsylvania German, which is used exclusively in the home and among themselves; High German, which is used in the pulpit, books, newspapers, and the Bible; English, which children acquire when they attend school and older people use when necessary. In preponderantly Pennsylvania German districts, some pupils come to school with no language but Pennsylvania German. Many prefer this dialect to English because they can think and express themselves in it more easily.

THE DISTRICT SCHOOL

Until after 1900, the quality of instruction in most rural district schools was low, as judged by present standards. A Venango County farmer, O. C. Sigworth, recalled his school days of about 1855: "The term was four months. . . . My father printed the alphabet on a smooth board which I carried to school, and my recollection is that at the end of the term I knew my letters. We furnished our own supplies, started when we wanted to and quit at our own will. . . . We had no examinations, knew nothing about grades, just advanced from the primer to McGuffey's fifth reader. . . . I taught my first term of school in 1868 and for that day carried a fair certificate, although I could not have passed the eighth grade examination as it is held today. I received $80 for four months, . . . Paid eight dollars per month for board."[3]

An unflattering description of the poorer type of country school was given by a Broome County, New York, graduate of this notable rural institution: "It stands at the cross roads an ugly box of a building with just the ghost of an ancient coat of paint remaining. The only evidence of beauty anywhere near is a couple of maple trees. . . . The toilet facilities are in outhouses with unscreened doors—one for boys and one for girls—side by side. For years obscene minds have left their records upon these buildings. . . . Around the wall [of the school room] the coats and hats of the children hang on nails, while dinner pails and rubbers clutter up the floor. Near the middle of the room stands a rusty stove which is uncomfortably warm for the children who sit near, while the children at the back of the room where the wind whistles thru the cracks are shivering. . . . The wood work is dingy with smoke and grime. . . . A battered dictionary lies on the teacher's desk, while a wheezy organ stands in a corner. . . . On a chair near the door sets the waterpail with the dinner dipper from which all of the children drink. . . . All the equipment used by the pupils, except the chalk which the district provides, they must furnish themselves. Instead of note-paper, the slates are in evidence which are cleaned with a sponge and a water bottle or in some cases with saliva as moisture."[4] A strip of red cord or felt was wrapped around the wooden rim of the slate. If held a little askew the slate pencil made a terrific screech.

Prior to 1900, practically all rural district schools were ungraded; the teacher had thirty or more classes a day of five to ten minutes each, ranging from the alphabet to the equivalent of the eighth grade. Ambitious rural youth who desired an education beyond the sixth reader, which was approximately the eighth grade, could get it only by attending an academy in town. Scarcely one in thirty ventured that far.

In 1915, there were 10,606 one-room one-teacher rural schools in Pennsylvania; of these, 886 had ten pupils or less.[5] Between 1920 and 1940, more than half of these were closed by consolidation or by abandonment because of declining rural population. In 1935, the average number of pupils was twenty-three; a State law provided that schools having fewer than ten pupils must be closed. In many rural communities, the one-room district school still is an important educational and social institution; in sparsely settled areas, no other kind is practicable. The drift, however, is definitely toward larger units through consolidation, because of the better educational opportunities they provide.

CONSOLIDATED SCHOOLS

The first consolidated or centralized elementary school was established in Massachusetts in 1874. The first such schools in Pennsylvania were at Linesville, Crawford County, and at Russell, Warren County, in 1892. About 1896, the topic, "Should our small, ungraded, one-room rural schools be incorporated into large, graded schools?" was discussed at many Farmers' Institutes; usually the verdict was negative. In 1900, there were only eight consolidated schools in the State. The following year, Pennsylvania Department of Agriculture published a bulletin on the subject which aroused much interest.[6] In 1901, John Hamilton, Pennsylvania Secretary of Agriculture, wrote, "The past year marks an era in the history of the education of country children in Pennsylvania. . . . An appropriation of $50,000 [was made by the Legislature] for the carrying of the Township High School Law of June 28, 1895, into effect, and by the passage of an act providing for consolidating the township schools into a single central graded school and for the transportation of scholars to and from this central school. The operation of these two laws will make it no longer necessary for parents to send their children to the town or city schools to be educated, but their academic training, preparatory to entrance into college, can be had in every community. . . . No [legislation] . . . since the consolidation act of 1854 is more valuable to country people."[7]

The School Code of 1911 included all previous legislation relative to consolidation, and authorized the School Directors of any district to "close and consolidate any one or more of the public schools in a district and . . . the pupils who belong to the same shall be assigned to other schools; Provided: That in any district of the fourth class pupils who belong in any closed school and reside one and a half miles or more from the school to which they are assigned shall be furnished proper transportation at the expense of the district to and from the school to which they are assigned." Few rural districts took advantage of the Act until after 1920; country roads were poor, and wagon transportation was uncomfortable and costly.

In 1920, the State Grange denounced consolidated and vocational schools as impracticable; this point of view was reiterated in 1922.[8] In 1925 the Grange proposed: "That teachers be employed for the entire year, that during the winter they be employed in the township high schools, teaching the older pupils who can travel longer distances, . . . that during the summer months they be employed in what is termed 'the little red schoolhouse,' teaching the children of tender years, who should not go too far away from home. This would not call for the dangerous exposure of children to the elements during the winter months and would enable the older boys and girls to be profitably employed on the farms during the summer."[9]

Rural sentiment for the retention of the "little red schoolhouse" (this well-worn description is poetic license; most of them, if painted at all, were white) was strong in some parts of Pennsylvania until after 1930. In 1920, a farmer voiced his dismay at the trend of the times: "Centralized schools are the talk—the coming fad. . . . We must look for other buildings, in these times quite an expense. . . . Hauling is very expensive, but omitting that item, let us consider . . . above all the moral effect of herding together big and little, good and bad 'kids' in the same carriage without a chaperone! . . . let us not forget the time that many will be away from home, in some cases from 7.00 A. M. till 5 or 6 P. M. thus preventing them from doing the chores. . . . The children in a one room school hear those in the upper grades recite . . . thus unconsciously absorbing much knowledge."[10] Opposition to consolidated schools was based not only on sentiment for the little red schoolhouse but also on fear that the principle of home rule in school administration would be abrogated.

In spite of the objection of many rural people to "Fineganizing" rural schools (Thomas Finegan then was Superintendent of the State Department of Public Instruction and an energetic proponent of consolidated schools), the movement continued to make headway. During the ten-year period from 1905 to 1915, over 500 one-room district schools were closed by consolidation. In the year 1921, over 1,700 were merged.[11] After 1925, consolidation proceeded at a rapid pace in all except the most thinly settled and mountainous districts where it was least practicable. Improvement in roads and the use of the auto-bus accelerated the movement. By 1927, there were over 400 rural consolidated schools, and 2,300 one-room schools had been closed. Every county except York had at least one consolidated grade school; in some counties almost the entire school system was of this type. During the school term of 1925-1926, more than 22,000 pupils were transported to consolidated schools.[12] By 1939, there were 675 consolidated elementary rural schools and 4,000 one-room schools had been closed.[13]

Consolidation of rural schools proceeded much faster in some counties, especially those in the northern tier, than in others. By 1939, Pike County had closed ninety-one per cent of her one-room schools; Tioga County, seventy-five per cent; and Bradford, seventy-five per cent; whereas York County had closed only seventeen per cent. Many Pennsylvania German farmers, particularly sectarians, were averse to sending their children to consolidated schools and were involved in litigation with the Department of Public Instruction. On the other hand, in many districts there was as much or more community pride in consolidated schools as had existed previously in district schools. On April 14 and 15, 1932, over 1,200 men, women and children gathered at the Antis Township Consolidated School, Blair County, to grade and plant the grounds.

By 1940, most rural people were convinced that consolidated schools have definite advantages over one-room district schools. The larger number of pupils made it possible to establish grades and to secure better qualified teachers, the pupils had the stimulus of numbers, the curriculum was enriched, the buildings and equipment were much superior, and the expense was little if any greater. The chief disadvantages were the time-consuming transportation, the tendency to urbanize rural youth, and the removal of school administration farther from the people most concerned. The advantages outweighed the disadvantages.

INSTRUCTION IN COMMON SCHOOLS

Standards in teaching have risen markedly since 1840. In 1854, the General Assembly created the office of County Superintendent of

Schools and required that all who desired to teach be examined by these officials. If the County Superintendent deemed a candidate sufficiently proficient, he would issue a certificate to teach, even though the candidate might not have completed the sixth reader, which was approximately the equivalent of the eighth grade. Previously, candidates had been examined only by the school boards that employed them. The first Act of Assembly to provide for training teachers was approved in May, 1857. The first Normal School, that at Millersville, Lancaster County, was established in 1858; by 1898, there were thirteen such schools. Until after 1900, however, few of their graduates taught in rural schools because of the relatively low salaries as compared to urban schools.

The profession of teaching was not alluring financially. Prior to 1880, the salary of rural teachers for the school year of four to six months usually was not over $100; this was less than the pay of a farm laborer. Men teachers predominated in schools held during the winter, and women teachers in schools held during the summer. The usual recompense was $25 a month, out of which the teacher had to pay board of about $1.50 a week. Often the teacher served as janitor, also. No wonder the first Superintendent of Schools in Bucks County reported, in 1855, "The greatest difficulty that presents itself to mar the progress of our common schools is the dearth of qualified instructors."

Under the heading, "Cheering Sign of the Times," the first volume of *The Pennsylvania School Journal,* published in 1852, reported some exceptionally high salaries of Pennsylvania school teachers. These were:

"E. LAMBORN, at Smoketown, East Lampeter, receives $20 per month from the Board and $10 from parents, for the term of six months. He can also make his $30 per month out of a pay school the balance of the year. Here is an income of say $350 per annum.
"ELIZABETH GILFILLAN, at the western school in Lancaster township, receives $20 a month from the Board for a term of 8 months, and about $20 from citizens; making $180, with the opportunity of adding considerably from a pay school."[14]

Low scholastic standards for the profession were partly responsible for low salaries. "About 1880," reminisced an old farmer, "it was the custom for almost every farm community to turn out one or two school teachers. It was not difficult in those days to get enough 'book larnin'' to teach a country school. You simply attended the ungraded school in the neighborhood until you could work all the problems in Brooks' Arithmetic, had a smattering of other branches and were able to pass an examination given by the County Superintendent, and there you were."

After 1900, rural teachers were better prepared and the quality of instruction improved. Many had attended teacher-training classes in high schools and a few had graduated from Normal Schools. In 1922, however, when there were 10,000 one-room district schools, only a fifth of the teachers had completed a four-year high school; three-quarters of them were women, and one-quarter men; eighty per cent were rural born and reared.[15] As consolidated schools gradually replaced one-room schools, salaries became somewhat more attractive. In 1918-1919, the average salary of teachers in one-room district schools was $411 a year as compared to an average of $588 for teachers in urban schools.[16]

The disparity between urban and rural teacher salaries continued to be a disturbing factor. In 1937, *Pennsylvania Grange News* stated, "The city-ward movement of country school teachers is so great that the annual turnover is over fifty per cent, which means that the average tenure of a rural teacher is only two years. Having served an apprenticeship in a country school the teacher moves on to a better paid position in a borough or city school."[17] In 1938, the minimum legal salary for elementary teachers in fourth class districts was $1,000, with a required annual increment of $50 a year for four years. In 1940, more than three-fourths of rural elementary teachers were not college graduates, but practically all had completed high school or its equivalent.

METHODS OF TEACHING

After 1870, the "loud school," in which every pupil studied audibly and often quite vociferously, gave way to the "quiet school." This, however, was quiet only by comparison. The scratching of slate pencils, the clatter of copper-toed cowhide boots, the rattle of the dipper in the water bucket, the snapping of fingers to attract the attention of the teacher, and the constant parade of classes to the front of the room to recite prevented the silence from becoming oppressive. Not infrequently, the acquisition of knowledge was accelerated by the application of the disciplinary rod.

Until after 1900, most rural schools were ungraded; each pupil progressed as rapidly or as slowly as he or she was able. Each of the ten to twenty-five pupils might represent a different point of progress. The three R's dominated the curriculum. The most common textbooks were McGuffey's readers, Webster's blue-back speller, Ray's arithmetic, and Harvey's grammar. Spread-eagle elocution was popular, especially for the edification of adults on the last day of school. Such melodramatic declamations as "The Seminole's Defiance" and "The Deathbed of Benedict Arnold" never failed to thrill the audience. Friday afternoons were commonly devoted to contests—spelling bees and "ciphering matches"—and to declamations.

After 1900, the curriculum was enriched with history, physiology, geography, music, art, and other subjects, especially in consolidated schools. In 1921 the Philadelphia Interstate Dairy Council donated 75,000 quarts of milk to schools to demonstrate its value for improving the physical condition of under-weight children. This led to regular milk service in many schools and ultimately to the school lunch, which commonly included a hot dish, cereal, fruit, and milk and replaced the cold lunch from home.

Prior to 1880, the length of the school term was adjusted to meet the need for labor on the farm. Children who were too young for farm work were given a few weeks of schooling in summer; older children worked on the farm during the growing season and had three or four months of schooling in winter. The length of the school term depended mainly on how much money was available to pay the teacher. In 1900, the average rural child was in school only seventy days a year, even though the General Assembly had passed a law in 1895 requiring all children between the ages of eight and thirteen to be in school at least sixteen weeks a year. In 1925, the Legislature required 100-per-cent attendance of children up to fourteen years old in fourth class school districts, and seventy-per-cent attendance of children fourteen to sixteen years of age. The required minimum length of the school term in 1940 was 179 days, but practically all rural schools were open nine months, from September to June; thus children were not available for work on the farm during the spring rush. Few Amish children stayed in school beyond the eighth grade; if they completed this grade before they were fourteen, which was the legal age at which the children of this sect could withdraw from school, they repeated the last year and thus avoided attending high school. The Amish consider high school inimical to the preservation of the "old order."

Until about 1860, many rural schoolhouses were one-room log buildings with packed clay or puncheon floors. Rough boards fastened to the walls served as desks. The seats were plank benches, usually without backs. After 1860, most of these primitive buildings were replaced by frame structures. The blackboards of that period were merely boards painted black. A round stove was placed in the middle of the room. Not until after 1900 were central heating systems, ventilating systems, plumbing, and other means of safeguarding child health installed, mainly in consolidated schools.

RURAL HIGH SCHOOLS

In 1840, the public education of most rural boys and girls ceased with the ungraded common school. A few continued their training in private or State-aided academies; this necessitated leaving home and boarding in town at considerable expense. There were no public high schools except in a few cities. Attendance at academies was limited; in 1840 there were only 2,465 boys in fifty-seven academies that received State aid, and 1,430 girls in thirty-three "Female Seminaries."[18] Few farmers were interested in education beyond the common school; many were opposed to it. Majority rural sentiment in 1889 was expressed by a Somerset County farmer: "To send a boy beyond the common school will send him so far from the farm that he will not find his way back."

The first public high school in Pennsylvania was Central High of Philadelphia, established in 1836. In 1860 there were only six, all in cities. Opposition to them came not only from academies and church schools, but also from those who believed that provision of opportunity for higher education is not a proper function of the State. The high school movement did not develop any real strength until after 1890. In 1894 there were only twelve rural high schools, all operating without State aid.

On June 28, 1895, the General Assembly authorized the establishment of public high schools in rural districts and provided State aid for them. Further impetus was given to the movement by the Act of 1901, which authorized school directors to provide transportation to these schools for pupils living more than three-quarters of a mile from them. By 1940, practically all former two-year and three-year high schools had adopted a four-year curriculum. As the number of public high schools increased, academies waned; of the more than 300 chartered up to 1900, only a few of the strongest survived, mainly as college preparatory schools. In 1940 there were from three to twenty high schools in every rural county.

The introduction of vocational agriculture, home economics, and manual training into the curriculum of rural high schools after 1917 greatly strengthened public support of them. Pupils were no longer influenced by the school program to think that unless they left the farm their lives would not count for much. Even children of conservative Mennonites attended high school. Amish children, however, did not. There were no inequalities of attainment among Amish resulting from differences in education, since no member of an Amish community had more than an elementary education.

The marked increase in the number of high schools after 1895 made possible a similar expansion in colleges and universities, which rural youth attended in constantly increasing numbers. Of the ninety-three degree-conferring colleges, universities, and theological seminaries in Pennsylvania in 1940, fifty-two were privately supported, church-founded institutions.

STATE AID

The cost of maintaining public schools is a heavy burden on rural tax-payers. In 1887, a Berks County farmer protested, "It is robbery to tax one man to educate another man's children." For many years, district school boards were ultra-conservative in assessing school taxes. Conditions that prevailed in 1912 were stated by one discouraged schoolman: "If we are to have better schools, the first thing necessary is to spend more money. . . . It is the commonest thing in Pennsylvania for townships to call for a five mill assessment when they are permitted to call for a twenty-five mill assessment for school purposes. . . . Are you paying your school teachers at the rate of $300 per annum when even the day laborers of Philadelphia get $580?"[19]

The larger number of children in farm families as compared with urban families results in a corresponding higher cost of schooling. In 1935, thirty-seven per cent of all public school pupils were in rural districts. Education is not local in character. In 1940 it was conservatively estimated that at least half of the children reared in rural districts ultimately would live in urban centers. This is the justification for State aid to rural schools. A survey in Tioga County by Fred P. Weaver in 1931 indicated: "64 per cent of the children educated in that county had left and are engaged in urban occupations. . . . At present the state pays 31 per cent of the cost of operating rural schools, but none of the building cost. The local people, therefore, pay approximately 80 per cent of the total cost."[20]

The high cost of rural schools was particularly burdensome during the depression period that followed World War I. Between 1928 and 1936, farmers protested vigorously against the greatly increased school taxes. In 1931, Fred P. Weaver found that school taxes in certain rural townships were 317 per cent of the 1913 taxes. He concluded, "The present system of distributing state aid for schools leaves a very uneven and excessive burden on rural school districts. From one-third to one-half of the work of rural schools is the training of future citizens for the cities and towns."[21]

In 1940, the major types of State aid to fourth-class districts (those having a population of less than 5,000) were for paying part of the salaries of teachers and for paying part of the cost of transportation of pupils. The amount of State aid was based upon the ratio of the value of taxable property to the number of teachers in the district. The State paid approximately one-third of the total average pupil cost in fourth-class districts.

Pennsylvania farmers, particularly as represented in the Grange, have opposed federal aid to public schools except for instruction in agriculture and home economics. They have objected to the proposed organization of a federal department of education, believing that this would lead, eventually, to federal control of schools.

OTHER RURAL EDUCATIONAL AGENCIES

While schools are the primary means of education, other agencies have made important contributions, particularly to the education of adults. From 1840 to 1875, the Lyceum, which originated in 1826 with Josiah Holbrook of Millbury, Massachusetts, was established in many Pennsylvania towns and was patronized by a considerable number of farmers. The most able men of the times delivered addresses on Lyceum platforms on a great variety of subjects. After 1880, the Lyceum was displaced by the Chautauqua movement. This was begun in 1874 on the shore of Lake Chautauqua, New York, for the purpose of training Sunday School teachers; but soon developed into a popular means of adult education in many fields. Russell H. Conwell of Philadelphia, founder of Temple University, is inseparably associated in the public mind with this movement; he delivered his celebrated lecture, "Acres of Diamonds," thousands of times from the Chautauqua platform. The Chautauqua movement was at its height about 1890. After 1900, adult education by means of correspondence courses, lecture courses, and traveling libraries became increasing popular.

In 1845, Congress sharply reduced postage rates on letters, newspapers, and magazines; this led to a marked increase in periodic literature in farm homes. Country newspapers were an important expression of the life of the communities in which they were published and exerted a powerful influence in moulding public sentiment. After 1890, the number of farmers who subscribed to newspapers and magazines increased rapidly. The celebrated literary periodicals of Philadelphia, *Graham's Magazine,* published from 1841 to 1851, and *Sartain's Magazine,* published from 1849 to 1852, were read by the better-educated farmers. By 1890, *Harper's Monthly, Atlantic Magazine, and Scribner's Monthly* (changed to *Century Magazine* in 1881) were read in the more progressive farm homes. *Ladies' Home Journal,* established at Philadelphia in 1883, soon displaced *Godey's Lady's Book,* also a Philadelphia publication, in the esteem of the distaff side of the family. Several generations of farm youth pored over the pages of *Youth's Companion,* published in Boston, Massachusetts. Many farmers subscribed to religious papers published by their churches.

Prior to 1890, few farmers read books except on religious themes, but some rural homes had dog-eared copies of Porter's *Scottish Chiefs,* Scott's *Ivanhoe,* Dickens' *David Copperfield,* and Thackeray's *Vanity Fair.* Hawthorne's *The House of the Seven Gables* and *The Scarlet Letter* also were perennial favorites. Before the Civil War Harriet Beecher Stowe's *Uncle Tom's Cabin* was more widely read than any other secular book. Many farm children had thumb-worn copies of

Robinson Crusoe, The Swiss Family Robinson, Gulliver's Travels, and the delightful stories by Louisa May Alcott, especially *Little Men* and *Little Women.* The boys were fascinated by the breath-taking tales of the woods and the red man by James Fenimore Cooper, especially *Deerslayer* and *The Last of the Mohicans.*

During the Civil War, the dime novel came into vogue. Lurid tales of the West, especially those published by Beadle and Company of New York, were read by the millions. Such thrillers as *The King of the Rustlers* and *Idaho Tom* were sold by nearly every country storekeeper. In these blood-and-thunder tales the villain always met his just deserts and the hero always triumphed in the end. They were proscribed reading in most farm homes, but many a country boy hid in the haymow to read how Old Cap. Collier tracked down the villains that beset him. The wholesome respect for the best in American and British literature inculcated in youth by the well-chosen selections in McGuffey's Readers was vitiated by this trash.

Free public libraries have not been as common in rural Pennsylpania as in some states, particularly in New England. Practically all the 272 public libraries in 1938 were in cities and large towns; rural districts were very inadequately served. In that year it was estimated that eighty-five per cent of the rural population of Pennsylvania was without public library service.[22] Five counties had no public libraries at all, and nine had but one each. In 1940, there were fifteen County Libraries that received State aid; the State and county cooperated in establishing a library which made books available to people in all parts of the county. An auto-truck carried them to schools, stores, post-offices, and homes. In 1939, six counties operated book trucks. The State Library loaned up to 5,000 books until the county was able to buy books. The sum appropriated by the county for the library was matched with State funds.

After 1881, Carnegie Library buildings, the gift of Andrew Carnegie of Pittsburgh, were erected in cities and large towns; the sites were provided by the communities, and the libraries were maintained by taxation.

The first traveling library for rural communities was established by Melvil Dewey, State Librarian of New York, in 1892. In 1899, the General Assembly appropriated funds to the State Library for this purpose. Soon 600 libraries, each of twenty-five to fifty volumes of assorted adult and juvenile books, were traveling over the State. On the application of any group or organization of six or more tax-payers, the library was deposited with any responsible rural agency, as a church, grange, school, farmers' club, store, or post-office. The books were returned within one to six months and a new lot could be sent; the only cost to the community was for transportation. In 1940, the State

Library had 200 traveling libraries in circulation. The State Library Extension Service maintained a mail library service of up to five books to individuals and schools.

Some city and town libraries have performed a similar function. In 1928 it was reported of "A Library on Wheels" that "Once a month this truck pulls up in front of each schoolhouse in Dauphin county outside of Harrisburg and the larger towns. The children are permitted to go out to it and select the books they care to read. It is made possible by an annual appropriation of $5,000 by the Board of County Commissioners of Dauphin county."[23] In 1939, after an aggressive campaign by Granges, Parent-Teachers' Associations, and other rural organizations, Lycoming County established free library service for all its rural people.

Since 1930, school libraries have played an important role in rural education, especially those connected with consolidated schools. In some cases the community and school have combined their resources; the library is housed in the school building and is used by both pupils and adults. In 1938, there were thirty libraries of this type.

ILLITERACY AND SUPERSTITION

Since 1910, illiteracy in rural Pennsylvania has declined each decade, from 10.1 in 1910 to 4.3 in 1940. In 1910 it was higher in rural than in urban districts, but in 1940 the reverse was true and the rural percentage was lower than for the nation as a whole. This is in marked contrast to the situation in 1851, when a Berks County farmer asserted, "Nearly one-half of its farming population is of the Teutonic race—only one in ten can read an English agricultural journal."[24] The United States Census of 1940 revealed that about thirty-nine per cent of the adult farm population of Pennsylvania had completed the eighth grade, about twelve per cent had completed high school, and about four per cent had completed college.[25]

Notwithstanding the more general diffusion of knowledge, superstition still clouds the minds of some farmers, particularly Pennsylvania Germans, though far less so than a generation ago. Cornelius Weygandt says, "I was brought up [about 1885] in familiarity with a hundred and one superstitions. . . . I was happy when a cricket chirped on the hearth in winter; or when a black cat came of her own accord to live with us. I . . . faithfully threw salt over my left shoulder when I spilled it at table. I still feel in my pocket for silver when I see a new moon over my left shoulder, and wish upon it if I find it there. . . . You have only to scratch the veneer off any man to find all sorts of primitive things beneath. . . . The supernatural is as instant to those of us who live in back country places as it was in medieval times to our ancestors in Germany."[26]

Some Pennsylvania Germans still believe in, and a few practice, "hexing" or "powwowing." In 1875, according to George Korson, powwowing was commonly practiced by both men and women. "Huntley," he said, "had a cow that began to give bloody milk. Powwow doctors said someone in the Huntley family had killed a toad. The only thing to do to heal the cow was to allow her milk to soak into the ground." Hexing usually brought misfortune to the *ferhexed.* Cornelius Weygandt tells of the dire consequences that followed a serious disagreement about 1880 between a valley farmer of Berks County and his neighbor whose farm was on a hill above him: "Shortly after [the quarrel], hogs of the valley man sickened and dropped off one by one until six were dead. Meanwhile one of his mules was mired and broke his leg and had to be shot. A cow died of milk fever after calving. The valley man went over the mountain to consult a famous powwow man in Schuylkill County. The powwower told the valley man that the hill man had bewitched the stock. . . . The witch doctor told the valley man that if he went to one of the great wooden uprights in the underground stable of his barn he would find a hole in it with a wooden plug and hair of the pigs and mule and cow behind the plug. He found a hole bored out with an auger, and plugged, of course, and a wad of hair at the back of it. After the removal of the hair no more of the stock died. . . .

"The valley man had no more bad luck that winter, but by spring he was so uncomfortable living there under the 'hex's' eye, with the water from the 'hex's' place running down through his pasture, that he sold out and moved down into the Tulpehocken valley."[27]

Belief in witchcraft still persists among a credulous few. In 1930, the editor of *Pennsylvania Farmer* was informed by a subscriber, "One of my neighbors has inherited a book on witchcraft brought from the old country long ago and is now practicing the black art in my neighborhood. Can you give me the name of a witch doctor who can stop that kind of thing?" Samuel P. Bayard records, "In 1935 some real witch doctors (or, as they are oftener called, wizards or witch masters) were exercising their arts in Pittsburgh. The often-heard stories of bewitched horses refusing to climb a hill or of unfortunate sleepers roused in the dead of night and ridden with saddle and bridle by witches for incredible distances, may still be heard in the hills of Pennsylvania, as elsewhere in this country. Charms and receipts galore to induce love, dispel sickness, or learn the name of one's destined life partner can still be found. . . ."[28]

According to Thomas R. Brendle and William S. Troxell, "The Pennsylvania Dutch believe that on Christmas Eve, at the stroke of twelve, bees speak in their hives and cattle in their stalls . . . and the dew which falls upon hay placed outside the barn that night will bring health to a farmer's cattle."[29]

Superstition is by no means confined to Pennsylvania German farmers; some of the more analytical-minded Scotch-Irish also exhibit seventeenth-century credulity.

These and other vestiges of medieval superstition gradually are giving way to knowledge based upon scientific research.

EBB AND FLOW OF RELIGIOUS FAITH

During the century comprised in this survey, the rural church passed through successive periods of enthusiasm and stagnation. From 1840 until the outbreak of the Civil War, religion was a powerful force in rural life. Church attendance was almost universal.

There were not as many "Millerites" in this State as in New York, but there were enough to affect profoundly the religious life of the times. About 1833, William Miller, of Low Hampton, New York, an ignorant but sincere man, began to preach that the second coming of Christ would be on October 24, 1844, when He would appear to judge the world; and that the earth would be consumed by fire at that time. As the fateful day drew near, his numerous followers were roused to a pitch of religious frenzy. Thousands gave away their farms and other worldly possessions and assembled in different places, clad in white robes, to meet their Lord. There was a furious hurricane on October 24, but no consuming fire or other supernatural manifestation; whereupon the prophet announced a later date. When nothing unusual occurred then, he announced still another, and so on until at last the patience of his disillusioned followers was exhausted.

This was a period of intense religious emotionalism. Revivals or "protracted meetings" commonly were held in late winter, and camp meetings in late summer. The great revival of 1858 followed the financial panic of 1857 and added thousands to the churches. The almost invariable theme was "Flee from the wrath to come." Hell for the "unsaved" and Heaven for the "saved" were preached with all the fervor of profound conviction.

Spiritual losses from the Civil War were fully as great as physical losses. After the war there was a protracted period of cynicism and reckless speculation, which was not dissipated for several decades. The same was true, though to a less degree, after World War I. During the years of the Great Depression, from 1929 to 1940, rural churches lost heavily; most people did not turn to religion as a solace in their distress as they had in years past. In 1940, there were 7,652 rural churches in Pennsylvania with 1,154,000 members. At that time, only fifty-four per cent of Pennsylvania people were church members.

The most striking shift in the relative numerical strength of different religious groups during the century was the emergence of the

Roman Catholic Church as the dominant single religious group of the State, from a very small body in 1840 to nearly half the total number of communicants in 1940, mainly in urban and industrial centers. This was due to heavy immigration from Catholic countries in Europe. Rural Pennsylvania continued to be overwhelmingly Protestant. The leading Protestant denominations numerically in 1940 were Lutheran, Methodist Episcopal, Presbyterian, Baptist, Reformed, Protestant Episcopal, United Brethren, Evangelical, German Baptist Brethren, and Disciples of Christ, in the order named. Practically all Jewish communicants were in cities and towns. The United Brethren, Disciples of Christ, and Evangelical churches originated in Pennsylvania. During the century there was a marked reduction in the number of Friends, Mennonites, Moravians, and Schwenkfelders. No new communistic religious groups were established; but the Harmonists, at Economy, Beaver County, continued to function until about 1900. In 1940, the Amish, practically all of whom are farmers, had twenty-four churches with 2,382 members, mainly in Lancaster, Mifflin, and Somerset counties.

CHURCH SERVICES

The changed conditions that prevail in rural churches are evidenced by the passing of the horse sheds that clustered around them a generation ago. Most farm families now drive to church in automobiles. In 1924, the editor of *National Stockman and Farmer* turned back, in memory, the pages of time: "The unused sheds, crumbling under the relentless battering of the elements, have become an eye-sore. . . . The old landmark stands gaunt and friendless, stretching its withered roof and warped weatherboards in futile protest to the passage of the surrey and the phaeton. The gallant steeds that pawed the cobble stones and switched flies under its welcome shade have gone to their reward. But memories of that shiny new buggy, spotless harness and restless driving horse, of that ride home past fields of curing hay, are . . . as fresh and as beautiful as the new church grounds will be."[30]

As a group, rural clergymen are consecrated missionaries of the Christ whom they serve, although some have stressed denominational differences unduly. Their salaries, in many cases, have not been sufficient to attract well-trained men; many of the ministers of some denominations have had only meager academic and religious training. From 1840 until 1860, Methodists greatly increased the number of their itinerant preachers and their colporteurs carried the Bible to thousands of isolated farm homes; most of these devout men were untrained. Since early colonial days, Presbyterians have insisted on a well-educated ministry. Washington and Jefferson College, which was founded and sustained by Presbyterians of western Pennsylvania, prepared thousands of youth for the ministry. At the other end of the educational scale are the Old Order Amish, who do not believe in an educated ministry; they point out that Christ selected His disciples, who became apostles, from laymen. All the church officials of that unique religious group—bishops, ministers, deacons—are chosen by lot. All are farmers and none is paid for his service.

A century ago, church membership entailed solemn obligations. William J. McKnight recalled his boyhood days in a Presbyterian church in Jefferson County, about 1840: "The token was then given out on Saturday to all those who were adjudged worthy to sit at the Lord's table. These tokens were taken up on the following Sunday while seated at the table. Friday was 'fast' or preparation day. We were not allowed to eat anything, or very little, until the sun went down. I can only remember that I used to get hungry and long for night to come."[31] Among favorite hymns of Presbyterians and other religious groups at that time was:

When I can read my title clear
To mansions in the skies
I'll bid farewell to every fear
And wipe my weeping eyes.

Another was:

There is a land of pure delight
Where saints immortal reign;
Eternal day excludes the night
And pleasures banish pain.

One by one the stalwart Christians who sang these hymns left this earth to dwell in "mansions in the skies."

After 1860, violent religious emotionalism was less evident in regular church services but persisted in camp meetings and revivals. Camp meetings were held in groves which were surrounded by the frail cottages of habitues. A few camp meetings still are held in Pennsylvania, but for the most part they have been succeeded by church camps devoted primarily to religious education, particularly of youth. The first church camp was established by Baptists at Mahaffey, Clearfield County, in 1896. In 1940, there were eighty-five such camps. The most spectacular religious revivals between 1880 and 1900 were those conducted by Dwight L. Moody as preacher and Ira D. Sankey as leader of massed inspirational singing. Usually these were held in cities, but they attracted thousands of country people, many of whom "hit the sawdust trail" under the burning eloquence of the evangelist.

The Sunday School (First Day School to Friends) has been a useful auxiliary of the rural church for nearly a century. The Pennsylvania Sabbath School Association is one of the strongest in the nation. The Church Amish have Sunday Schools, but the House Amish do not; they consider that this would be a step toward becoming "worldly."

Except in Quaker Meetings and in the services of Old Order Amish, there was a marked increase in church instrumental music after 1840. The singing of hymns to the accompaniment of the organ or melodeon gradually supplanted versified psalms and the tuning fork. This innovation was resented by many of the older members. Until recent years, Mennonites used the *zitter* (zither) to accompany church hymns. According to Walter M. Kollmorgen, "The Old Order Amish have the distinction of using what appears to be the oldest hymn book in use in America . . . the *Ausbund,* [which] appeared in its present form as early as 1560. Many of the hymns were composed by martyrs shortly before they were burned or put to death in some other way. Musical instruments are prohibited . . . and there are no musical notations for the hymns. . . . All the tunes . . . are handed down from generation to generation. . . . All the songs are sung very slowly and dolefully. The song leader . . . sets the pitch . . . and usually covers a number of notes before others join. . . . Part singing is prohibited by the church for it is considered worldly."[32] The *Ausbund* never has been revised; it is reprinted in the same archaic dialect and spelling, including typographical errors, of the early editions. "The Amish in America," says J. William Frey, "still sing a derivative tune of a song that in various forms is now at least 1,100 years old!"[33]

In 1840, the services in practically all Lutheran, Reformed, Mennonite, and other distinctively German churches were conducted in German. By 1860, about two-thirds of these churches did not require that German be the language of the pulpit, and by 1900 most churches, except of the sectarians, used English. The Amish still use in their church services the language of the Rhineland from which their ancestors came more than two centuries ago, but their spoken language is Pennsylvania German, an ancient German dialect which has become mixed with English words.

In 1936, *Pennsylvania Farmer* described the service of Church Amish in Lancaster County: "They gathered in a severely plain white-washed one-story edifice shaded by tall maple trees. Long before the services started the first carriages began to arrive. . . . All were black and unornamented. . . . Horses were quartered in one of three white-washed sheds, each 120 yards long, which enclosed the plain church. . . . The services lasted over two hours and the sound of the choral singing resounded over the countryside. Sunday is visiting day. . . . It is no unusual thing for one family to have thirty to fifty guests in the afternoon."[34]

"Among the Old Order Amish," says J. William Frey, "worship services are held biweekly and are rotated among the homes of the various members of a particular church district (called *Keer* in the dialect). Backless wooden benches are arranged for the congregation, whose members are seated in four separate groups: married men, married women, unmarried men, unmarried girls. A dinner of '*schnitz*' pies, pickles, cold cuts, beets, coffee, jelly, and bread is consumed by the congregation at the close of the service. The service itself averages about four hours."[35] There are two sermons, the "short sermon," which lasts about half an hour, and the "long sermon," which lasts one to one and a half hours. The speakers are not permitted to use notes, since it is desired that the spirit shall function in them. After dinner, the congregation visits for an hour or two; then the clatter of hoofs and wagon wheels on macadam highways indicate that the members are dispersing to their homes to do the evening chores.

London Grove Meeting House

The family at whose home a House Amish service is held is busy most of the preceding week getting it and the food ready. The house is cleaned from cellar to garret, rag rugs cleaned, walls painted, cellar walls whitewashed, stoves polished, yard raked, fences whitewashed, manure hauled out, so that everything about the home may meet the approval of neighbors and friends.

CHURCH ATTENDANCE AND DISCIPLINE

The rural family of 1840 that did not attend church was rare indeed; the church was an expression of the religious faith of the entire community.

Among the advantages commonly claimed for good roads and the automobile is that they make it easier for country people to go to church. Sometimes they have made it so easy that automobiles do not stop at church, but speed along on pleasure bound. Nevertheless, the great majority of farm families still attend church. A survey of the Crooked Creek area of Indiana and Armstrong counties in 1936 revealed that eighty-six per cent of the farm people in that area attended church or church organizations, and fourteen per cent did not go to church at all. It was stated, "More than five out of every six persons in this area were attending regular church services or other meetings under church auspices."[36]

In most denominations, the severe discipline formerly imposed by the church upon its members has been abrogated or greatly lightened. The uncompromising discipline of Friends drove many of their youth into other faiths. Until recent years, many other religious groups, especially Presbyterians and German sectarians, were very stern in the application of church discipline. Young people who danced, played cards, or played games on Sunday were "churched"—dropped from membership.

Church discipline still is exercised in almost unabated severity by the Amish Church, which prescribes the dress, habits, and behavior of its members as well as their religious views. Among the many taboos of this sect are owning or driving an automobile; patronizing a saloon or liquor store; owning or riding a bicycle; attending a movie or theater; smoking a cigarette or pipe; attending a carnival or county fair; taking prizes for superior farm products at fairs; playing organized baseball; owning or using a radio or other musical instrument; some Amish groups forbid owning or using a tractor or motor-truck; playing cards or gambling in any form; swearing; reading non-Biblical literature; telling lewd stories; parting the hair on one side or curling it; decorating horse harness; having one's picture taken (this "engenders pride") and many others. The desire of Amish youth to own and drive an automobile is a frequent source of dissatisfaction and sometimes of open rebellion.

Amish commonly apply the literal Biblical interpretation of *meidung*—to shun members who have sinned or departed from church law. While it is in force a wife is expected to abstain from all intercourse, even from conversation, with her erring husband. The *Mennonite Quarterly Review* gives this gripping account of a meeting of Old Order Amish in Union County at which several members were excommunicated: "The excommunication of members was a solemn and awful occasion. The members to be expelled had been notified in advance and were absent. An air of tenseness filled the house. Sad-faced women wept quietly, stern men sat with drawn faces. The Bishop arose; with trembling voice and tears on his cheeks he announced that the guilty parties had confessed their sins and that they now were cast off from the fellowship of the church and committed to the devil and all his angels."[37]

PROBLEMS OF THE RURAL CHURCH

The industrial revolution, mechanization of farms, and modern methods of transportation have had a powerful impact on the primary rural institutions—home, church, and school. Even before the advent of the automobile, many rural churches were finding it difficult to maintain the old order, some because of dwindling rural population, others because of the development of new centers of community life. In 1910, before automobiles were common, Fred W. Card of Bradford County stated, "The country church has had in recent years a hard struggle. It has lost some of its oldtime influence. It faces the need of a readjustment in its methods and obligations. . . . I believe the church should be in closer touch with the affairs of the community in which it is located, in other words with the farmer and the home."[38]

A survey of Pennsylvania made in 1920 by the Interchurch World Movement revealed that many rural communities were greatly overchurched. A small community in Susquehanna County had seven churches, all of which were barely existing. The ministers were greatly underpaid; one received a yearly stipend of $150. It was stated, "Of 56 rural pastors in Susquehanna County 21 are engaged in outside activities to add to their inadequate salaries. . . . Of the fifty-six clergymen referred to, twenty-six serve one congregation each, sixteen serve two each, nine serve three each, four serve four congregations apiece, and one man serves six congregations! . . . The people in the rural districts, using automobiles, telephones and improved farm machinery, are asking why they should have to be content with the circuit system, absentee pastors and one-room church buildings of a past century. . . . The rural survey . . . confirmed what was generally known, that the rural church . . . was losing its hold on the community, and that the church was being left to stagnate in many country districts. . . . As a rule, no attempt is made by the rural church to provide healthy, normal social attractions for the young."[39]

As the automobile, radio, movie, and other twentieth-century developments transformed rural social life, the country church was pushed more and more into the background. At a conference held by the Reformed Church, in Berks County, in 1927, Ralph S. Adams stated, "The membership of the little country church is small and growing smaller year by year. The attendance is falling proportionally even more rapidly. The buildings are too small and too poorly equipped to put on the necessary program of religious education and social endeavor.

. . . The pastor must divide his time between two to six congregations. . . . and as a consequence is unable to supervise and direct the work of religious education, or to organize and guide his young people in some form of organized activity. He is overworked and underpaid. . . . His mind is often on his financial embarrassment."[40]

The most glaring weakness of many rural churches is their lack of provision for the social life of their young people. In a survey of social activities in a rural district in Chester County in 1927, it was found: "The churches of the Unionville area made little direct contact with the youth of 14 to 21 years. In 70 per cent of the families having 70 per cent of the children within these age limits, no church attendance whatever was reported for the boys and girls. . . . Nearly six-tenths of the group were without Sunday School contacts. . . . In striking contrast with the foregoing are the data concerning attendance at moving pictures. Seventy-two per cent of the boys and girls attended the movies 35 times during the year."[41] A similar survey of a rural community in Centre County made in 1937 revealed, "Although there were eight churches within the community, slightly less than half of the people over six years of age were members of local congregations. . . . Eleven per cent held memberships in churches outside the community and 39 per cent had no affiliation."[42]

The automobile has played a major role in the decline of many rural churches. It has tempted country people to go for a pleasure ride on Sunday instead of to church. It has led many farm families to transfer their membership to town churches. A nation-wide investigation by the Institute of Social and Religious Research in 1927 developed the fact that nearly a third of the membership of churches in rural towns was farm families that had forsaken their local church. The reasons given by them for the transfer of membership were better ministers, better buildings, better music, and more people. The automobile has extended the rural church-going radius from four or five miles to twenty or more miles. Transfer of membership to a town church, however, may have made possible a gain in the religious life of many individuals that would not have been achieved had they continued to attend the country church.

The decline of many rural churches may be attributed to their failure to maintain leadership in the social life of the community; this important function has passed to other rural institutions, chief of which are the Grange and the consolidated school. This situation was forcibly expressed by *Pennsylvania Farmer* in 1914: "The average rural church, closed as it is six days of the week, and often open only for the morning service on the seventh, is a monument to the coldness and the barrenness of life in its neighborhood. . . . The church is, or should be, the logical social center of the country community . . . a place of warmth, light and social cheer, where . . . gatherings may be held several nights a week. . . . Too often it can be said of the rural church that it performs its drowsy spiritual mission in a drowsy way, that it ministers to the sick and buries its dead, but that it never touches the community it serves in a vital way. Like the proverbial closed parlour 'its cold walls have never echoed back the laughter and normal gaiety of human life.' "[43] It may be granted that the primary function of the rural church is spiritual, not social; but usually the more spiritual a church is, the more it is concerned with the social life of its people and with social service to others.

Some rural churches have maintained their position as the center of community life. "In spite of the competition of Grange events, the automobile and the small-town movie," says Ralph Wood, "the church has remained the center of community life in the Pennsylvania countryside more than is usually the case in modern America. The visual proof of the hold the churches have on the people is the buildings themselves. Nowhere in America are there such large numbers of well constructed churches. . . . Church suppers and entertainments still attract . . . many people. . . . In the basement social rooms, often as large as good-sized school gymnasiums, sometimes larger, huge crowds gather to bear witness to the fact that Pennsylvania Germans not only worship in their churches, but enjoy themselves there."[44]

Denominational differences, often of a minor nature, and denominational prejudices, usually unjustified, have resulted in the over-churched condition of many rural communities. Competition for existence among churches creates hard feelings; it is difficult to conduct graded Sunday School work; programs for young people may be impossible and the ministers, who often have two to six charges, are over-worked and under-paid. In a survey of representative rural villages in Pennsylvania, made in 1923, it was found that one typical village had eighteen churches, one for every eighty inhabitants. These churches represented nine denominations. Eight of them had less than twenty-five resident members each, and several were sustained by home missions. One reason for this situation, according to *Pennsylvania Grange News,* is that "The village is . . . a retreat of the elderly. . . . The older people cling with tenacity to the rites, customs and liturgies to which they have been used for many years."[45] Four out of every five country (not village) churches had less than 100 members and many had less than twenty-five. After a survey of closed rural churches, mainly in northern and western counties, William G. Mather summed up the major factors responsible for the decline of rural churches of Pennsylvania: "population decline; changes in type of population or to another religious faith; too many churches; congregational disputes; unsatisfactory professional leadership."[46]

DENOMINATIONAL COOPERATION

The report of the Country Life Commission appointed by President Theodore Roosevelt in 1908 led to state and community conferences on conditions in country life, including the rural church. Efforts were made to soften denominational rivalry and promote cooperation between different religious groups. The Federal Council of Churches in America, representing thirty-three Protestant denominations, was organized in 1908. The ultimate goal of this movement was Protestant unity, so far as this might prove to be practicable; the immediate objective was better cooperation between rural churches and, in some cases, federation. The Pennsylvania Council of Churches was organized in 1911 as a branch of the Federal Council.

The Department of Town and Country Churches of the Pennsylvania Council of Churches sought to promote a larger measure of cooperation among rural churches on a community basis. In 1939 it held a series of six regional conferences around the State at which rural pastors and laymen were brought together to discuss the problems of the country church. Courses on rural social and religious problems were introduced into the curricula of theological seminaries and colleges. The first Short Course for Town and Country Pastors in Pennsylvania was held at The Pennsylvania State College in 1938 and annually thereafter; the economic, social, and moral problems of rural people were discussed by rural pastors from all parts of the State, without denominational bias.

In 1930 the Federal Council of Churches in America began to promote the readjustment of country churches to twentieth-century conditions through federation. Church federation has proceeded slowly in Pennsylvania, even in communities that obviously are greatly overchurched. The proposal to combine several struggling Protestant churches into one strong one is opposed by many sincere people who have been nurtured from childhood on theological differences and prejudices; possibly these are stronger in Pennsylvania than in any other state. Nevertheless, some progress has been made in various types of denominational cooperation and even in federation.

At McConnellsburg, Fulton County, a Presbyterian church of ninety-eight members (in 1939), organized in 1769, and a Reformed church of 146 members, organized in 1830, maintain separate church properties, organization, and services; but worship alternately in the morning and evening, and the same pastor serves both congregations. In 1936 *Pennsylvania Farmer* reported, "Two rural congregations of different denominations joined in dedicating a new church at Stiltz, Pa., recently. Here on the borderline between Pennsylvania and Maryland these two congregations have worshipped together for 142 years, each retaining its identity but both attending services conducted by Lutheran and Reformed ministers on alternate Sundays. As an example of applied religion this record stands in shining contrast to the situation in less fortunate communities where contention rather than true cooperation prevails."[47] More than 100 rural church buildings are shared by two congregations, usually Lutheran and Reformed or Evangelical and Reformed.

The population of the township in which Orwell, Bradford County, is located declined from 1,420 in 1870 to 702 in 1930. It was served by two churches, a Presbyterian, organized in 1815, and a Methodist, organized in 1828. In 1930, when the combined membership of both churches was only seventy, the two groups federated. While each group retained its identity, both were served by the same pastor in a union service.

Denominational differences are far less corroding now than they were a generation ago. John W. Dinsmore recalled, "As a boy, about 1850, often have I seen a man riding on horseback along the ridge above our farm on the Sabbath morning on his way to a little gathering of Old Side Covenanters at least twelve miles from his home. Late in the evening he might be seen wending his way homeward, silent, saturnine, solemn, having done his duty as he saw it and given his testimony. On his way he passed within easy reach of several Presbyterian churches, some of them very closely allied to his own, yet he would have gone to the stake without a moment's hesitation for the differences between them and him."[48] Today the differences between Old Side and New Side Covenanters of that day seem trivial indeed. The gaps that have separated Protestant groups are closing, slowly but surely.

There is developing, also, a spirit of mutual tolerance and cooperation between Protestants, Catholics, and Jews. The anti-Catholic riots in Philadelphia in 1844, which were inspired by the "Native American" party and in which many were killed and Catholic churches burned, could not occur in our generation.

In spite of the trend toward greater church unity, new divisions appear from time to time, some of them based on quite trivial issues. In 1940 there were three Amish groups—Old Order Amish, Amish Mennonite Conservatives, and Amish Mennonites. Prior to 1870, all Amish worshipped together as one religious group in farm homes or barns. Then the Church Amish, who now worship in church buildings, split off from the House Amish, who continued to worship in homes. Another division occurred in 1900. In the Kishacoquillas Valley, says Joseph W. Yoder, a liberal young minister "was in favor of colored shirts, yellow oilcloth top carriages, and store bought straw hats, and he was not entirely averse to the girls setting their 'caps' back a bit to show their hair and using broader 'cap' strings to make larger bows."[49] These issues do not seem to be of sufficient importance to justify dissension in a religious group, yet many divisions have been based on no more valid grounds.

In a State where people have complete freedom to worship according to the dictates of conscience, as provided by William Penn, differences of opinion and belief are bound to develop; these are healthful signs that democracy is functioning effectively. There are many who believe that the sole function of the rural church should be to preach the gospel, and that efforts to make it the center of community life and an agency for the social betterment of the neighborhood and of the world should be quite incidental to this primary objective. Others, equally sincere, would have the rural church devoted largely to social service. A few churchmen, in their zeal to make the rural church the center of community life, even proposed that the pastors teach classes in agriculture! This is a matter of approach and of relative emphasis upon two functions, each of which is an essential church activity.

While the trend toward greater denominational cooperation is unmistakable, it is disturbing to witness, at the same time, strong pulls in the opposite direction. Schisms in existing denominations are threatened by the "Fundamentalist-Liberal" conflict. After 1880, new findings of science and scholarship impelled many to reconsider the traditional attitude toward the Bible, while the more conservative were driven by these findings into resistance to all change. The religious conflict over biological evolution was at its height in the eighties. The conflict between orthodoxy and heterodoxy which has divided Christianity since the Reformation still goes on and will as long as men are free to examine and appraise the unfolding life of the spirit.

Many rural people have clung to the faith of their fathers, which was concerned chiefly with personal salvation; but an increasing number are seeking to make effective in their day the social teachings of Jesus. The desire to attain personal salvation in the life hereafter no longer is the chief motivating force in most rural churches. Organized religion was the chief support of the anti-slavery movement and of the prohibition movement. In spite of condemnation by some of their flock that they have used their sacred calling to incite partisan strife, many rural ministers have been leaders in movements to secure a larger measure of social justice in the community and in wider fields.

Already the Fundamentalist-Liberal controversy has seriously impaired the service of several religious groups. In 1924, *Pennsylvania Farmer* voiced the dismay with which most open-minded Christians view this internecine strife: "The newspapers and the radio bring us the news that war continues between two classes of Christians. The belligerents are assembling in two camps under banners inscribed

'Fundamentalism,' and 'Liberalism.' Charges and counter-charges are made. Hard words and stinging epithets are hurled back and forth, while the non-combatants stand in wonder asking 'What is true religion?' . . . To these inquirers, as well as to those engaged in the controversy, we recommend the reading of the 13th Chapter of First Corinthians until it can be repeated without the Book."[50]

Service in the armed forces of the nation has divided certain religious groups. Some Christians, particularly Quakers and German sectarians, have held tenaciously to their non-combatant belief. During the Civil War, few rural people held pacifist views except members of these religious groups. Friends, however, were by no means unanimous in this respect; torn between patriotism and pacifism, many "Fighting Quakers" bore arms and were promptly excluded from the Meeting. Those who persisted in their conscientious scruples against bearing arms in the service of their country had to endure the ridicule and hostility of the public. Many hired substitutes or made an exemption payment of $200. German sectarians, especially Plain People, had the same experience. In World War I, conscientious objectors of these and other religious groups were exempted from serving in the armed forces but were required to serve their country in a non-military capacity.

SABBATH OBSERVANCE

By 1890, secularization of Sunday had made considerable headway in cities; but rural Pennsylvania, for the most part, still observed the Lord's Day according to the Scriptures. The rapidly increasing pressures of urban life made many city workers desire to use their one free day for pleasure and recreation. The "Blue Laws" of Sunday observance, passed in the seventeenth century, still were on the statute book but seldom were invoked. After the automobile became common, about 1916, the highways were thronged on Sunday with city folks seeking diversion. There was strong urban demand for a "European continental Sunday," which means that most of the day is devoted to recreation and amusement without restraint. Among most rural people, however, Sunday continued to be a day for rest and worship.

The urban demand for "liberalizing" Sunday was met in 1933, when the General Assembly opened it to baseball and football games and other public sports and amusements on local-option vote. A secularized and commercialized Sunday was further assured in 1935, when the General Assembly authorized Sunday movies. These Acts were passed against the practically united opposition of representatives of rural districts in the General Assembly.

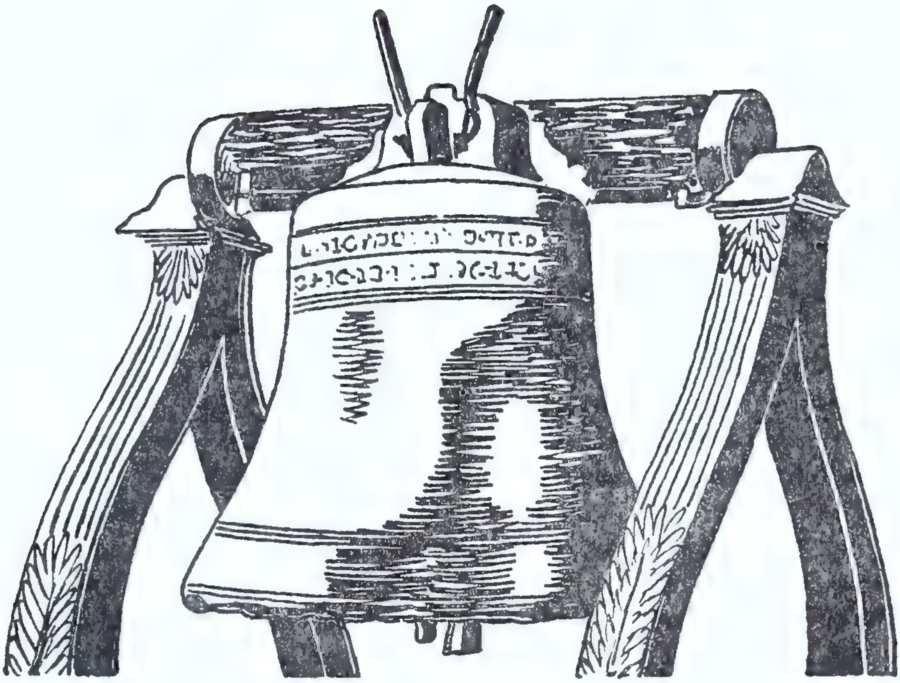
By 1940, the open Sunday had begun to invade the countryside. Some farmers operated roadside markets on Sunday because there was more trade on that day. Some farm families were more likely to be found in automobiles than in the sanctuary. For the most part, however, rural people continued to observe Sunday as the Lord's Day; only necessary farm work was done, such as feeding livestock and milking, no business transactions took place, and the family attended its accustomed house of worship. Sunday afternoons were devoted to family life and to visiting friends.

> A Sabbath in the country, still, serene;
> The very woods seem lifting up their heads
> In silent worship and the brooks, unseen,
> Sing songs of gladness o'er the lowly sands.

By 1940, family worship in rural homes, which was quite general in 1840, was the exception rather than the rule, save among a few of the more deeply religious. There was far less home training of children in religion than there had been a generation earlier; this paramount parental responsibility was left largely to the Sunday School, just as their intellectual training was left almost wholly to the public school and other public agencies.

In spite of these disturbing trends, Pennsylvania rural life has remained basically sound and reverent. Although "old time religion," in which the primary objective was personal salvation, has largely passed away, a more mature faith, having a far greater outreach of concern for the welfare of others, neighborhood and world-wide, has taken its place. Most rural people approach the sunset of life without misgivings; all that they had seen had taught them to trust God for what they had not seen.

XX



The Liberty Bell, Independence Hall, Philadelphia

FARMERS AS CITIZENS

THE CENTURY from 1840 to 1940 witnessed marked changes in the social as well as the economic status of farmers. They emerged from class consciousness and an inferiority complex to play a major role in the life of the Commonwealth and the nation. As commercialized and mechanized agriculture replaced manual and self-sufficing agriculture, farmers were projected into the world of affairs. They became important citizens of the democracy, wielding an influence far greater than their relative numerical strength.

THE CHANGING PATTERN OF COUNTRY LIFE

Centuries ago Sully, an eminent French statesman, voiced a truth that has been amply demonstrated in America: "Tillage and pasturage are the two breasts of the state." They are the major sources of food and supply many of the raw materials of industry. In 1907, President Theodore Roosevelt gave recognition to the primary importance of agriculture: "The permanent greatness of any State must ultimately depend more upon the character of its country population than upon anything else. No growth of cities, no growth of wealth can make up for a loss in either the number or the character of the farming population."[1]

By 1860, rural Pennsylvania had relinquished the economic primacy which it had held since the founding of the colony. The value of the products of mines, factories, mills, and shops had begun to exceed the value of the products of farms. "Big Business" began its sway. Agriculture, however, continued to be a major enterprise. Although Pennsylvania is the thirty-second state in size and is cut up by mountain ranges, in 1940 it ranked eleventh in the value of its farm products; the output of its farms that year was valued at $238,000,000.

The real farm wealth of the State, however, cannot be measured in dollars. It is in the many thousands of prosperous farm homes wherein dwell people who exemplify all that is best in family and civic life. "The prime high endeavor laid before every farmer," said Liberty Hyde Bailey, "is to conquer his farm, and this means contest with storm and flood and frost, with blight and bug and pest, and with all the other barriers that nature has put against the man that tills the land. . . . In the nature of things, farming cannot be an easy and simple business, and this is why it has produced a virile lot of men and women, and why it will continue to do so." The family-size farm which is characteristic of Pennsylvania represents far more than a living; it is a laboratory for the perpetuation of democracy. "What constitutes a good farmer?" asks Dean Bailey and gives this cogent answer to his own query: "The ability to make a full and comfortable living from the land; to rear a family carefully and well; to be of good service to the community; to leave the farm more productive than it was when he took it."[2]

During the past century, the farmer has been transformed from a manual laborer, often poorly educated, into a highly trained specialist. In 1840, Nicholas Biddle of Philadelphia said, "The time was when it was the fashion to speak of the Pennsylvania farmer as a dull, plodding person quite comparable to the Conestoga horse by his side, indifferent to the education of his children, anxious only about his great barn. These caricatures, always exaggerated, have largely passed away. . . . But most farmers still are not alert to discover and adopt improved methods of farming. This is because they live apart; they rarely come together and have no concert of action." Since these words were spoken, automobile, telephone, radio, and commercial agriculture have ended rural isolation, and mechanical devices on the farm and in the home have greatly lightened the burden of physical labor. Today farmers are business men as well as husbandmen. They are employers of labor and have developed an employer consciousness. They are capitalists, actual or potential, having a considerable investment in land, buildings, and equipment. Although they have lost much of their former economic independence, they have gained immeasurably in social status and in higher standards of living.

The major changes in the pattern of country life during the past century are technological advance, commercialization, and urbanization. These have profoundly affected the point of view, habits, customs, and institutions of rural people. Oliver E. Baker has set forth the fundamental differences between urban and rural life which largely determine the point of view of farmers as citizens: "The farmer tends to think in terms of plants and animals, of birth and growth and death. The city man, on the other hand, tends to think in terms of wheels and levers and machines, or of buying and selling. Whereas agriculture is founded on life processes, particularly as influenced by soil and weather and the laws of inheritance; urban occupations are founded on manufacturing and commerce, and the activities are mostly carried on indoors. . . . The farmer lives in a natural world, the city man in an artificial world."[3] The trend of modern agriculture tends to minimize the marked differences that once existed between urban and rural life. Nevertheless, the farm still remains, in contrast with the city, an oasis of peace.

Percy Wells Bidwell and John I. Falconer have pointed out some of the fundamental changes in country life incident to commercial agriculture: "As self-sufficient farming declined there went with it long-established habits and traditions, not only in the method of getting a living, but also in ways of thinking and living. . . . There followed of necessity a change in the ideas and ideals of the rural folk, in family and in social relations. The self-sufficient economy emphasized the virtues of self-reliance and independence, of frugality and thrift. . . . It harnessed together in the production process all the members of the family, young and old, male and female; it concentrated attention upon the interests of the family group rather than upon the interests of its individual members. The introduction of the cash *nexus,* the selling of certain articles and buying of others, forced the farmers to confront a new set of problems, calling for the exercise of a new set of faculties. Shrewdness in buying and selling must now be added to the simpler qualities of hard work and saving. Farming became a more speculative business, for to the already existent risks of weather conditions was added the risk of price fluctuations."[4]

The contributions that farmers have made to the prosperity of towns and cities cannot be measured solely by the amount of food, clothing, and raw materials of industry that they have supplied. Of far greater significance is the large number of rural youth, ready for productive urban life, that the farms have nurtured. From January 1, 1920, to April 1, 1930, more than 170,000 people over ten years of age migrated from the farms of Pennsylvania to towns and cities. Except during periods of severe economic depression, this life-giving stream flows city-ward continuously. In 1928, the New York *Times* was moved to comment: "Urban America is more and more assuming leadership over rural America. . . . Those with the greatest fund of energy, the best developed powers of endurance and the most unrelenting ambitions are in the great cities. In the cities are to be found the best schools, churches, newspapers, bookstores, libraries, art galleries, museums, theaters. The cities are dominant in politics; they control elections and legislatures. Has the power of leadership deserted the country or is it merely lying dormant?" If it has, in fact, deserted the country—and this is by no means assured—it is largely because the creative energy of the cities is replenished annually by the absorption of virile rural youth.

Class consciousness in farmers has largely disappeared. Prior to 1880, one of the most disturbing characteristics of country people was their suspicion of outsiders, particularly city folks. They felt that they were looked down upon as "rubes," "hicks," "hayseeds"; and their defense mechanism was to withdraw even more closely into the rural shell. Rural-urban antagonisms were sharp in Pennsylvania. The "Rural Uplift" movement of the first two decades of the twentieth century, beginning with the report of President Theodore Roosevelt's Country Life Commission in 1908, aroused resentment among many farmers. As one farm journal expressed it in 1913, "There are upward of a dozen organizations that are trying to uplift the farmer. For the most part they are financed and managed by city men. It is a case of too much yeast in the dough."

In recent years, rural-urban understanding and cooperation have been promoted by the removal of rural isolation; this has been effected by the much wider public contacts required by commercial agriculture, the automobile, good roads, the radio, and other modern means of communication. Since 1911, when the first Rotary International club was organized in Pennsylvania, many farmers have become members of this and other urban service clubs. Most of these clubs have committees on Town and Country Relations which arrange meetings, dinners, and picnics at which prominent farmers of the neighborhood are guests. In 1929, *Pennsylvania Farmer* reported, "Thursday of last week 560 men sat down to a banquet in the Yorktown Hotel at York, Pa. About half of them were farmers, the other half were business men. They met in the interests of a better York county, recognizing . . . that the welfare of one group affects the welfare of the other group. They discussed roads, and tariffs. Last year on a similar occasion they discussed taxes. These occasions are driving home their mutual relationships and interests."[5] Similar evidence of rural-urban good will and cooperation may be observed all over the State.

In 1927, *Pennsylvania Farmer* began to make the award of Master Farmer. Each year a limited number of farmers who were outstanding in the successful and business-like operation of their farms, whose homes and home life reflected high standards, and whose participation in community affairs, particularly the church and school, gave evidence of good citizenship, have received this much-coveted distinction. The Master Farmer award epitomizes all that is best in the economic, social, and civic life of farmers.

FARMERS IN PUBLIC LIFE

The number of farmers in the General Assembly has dwindled steadily. In 1845 it was reported, "The larger part of the State legislature are farmers, much the larger part of the remainder, men who represent agricultural districts; few are from large towns, and none perhaps, so far removed from the country, as not to be alive to its importance. . . . Nor is it probable . . . that any assembly of men will ever meet in the State and dare openly to do anything which is opposed to their wishes or their will. . . ."[6] This rash prophecy was soon discredited.

In 1890, Eastburn Reeder, a farm leader of Bucks County, protested, "We do not want to have our representation in congress, consisting of twenty-eight members, to have fifteen of them lawyers, and the balance composed of men of other professions, with not a farmer among them."[7] In the General Assembly of 1927, only nine Assemblymen and two Senators were farmers. The dearth of farmers in the Legislature after 1880 was due in part to the reluctance of certain elements of the rural population to enter public life. The Plain Churches discouraged and sometimes prohibited their members from holding public office except, possibly, on local school boards. There was and still is among them a tendency to discourage voting save on local issues. Recently an elderly Amishman stated that he rarely had voted, "because I like to think of myself as a citizen of the Kingdom of Heaven and not as a citizen of the world."

Although there were few farmers in the General Assembly after 1880, agriculture was not without influence in that body. In 1893, the Philadelphia *Press* spoke disparagingly of "A League of Rustics" in the General Assembly.[8] This was an organization of members of the Senate and House who represented rural districts and who cooperated to advance rural interests. Similar farm blocs have operated in subsequent sessions of the legislature. A few Pennsylvania Congressmen have been members of Congressional farm blocs, the first of which functioned in 1921. In 1922, two prominent members of the Grange, Gifford Pinchot and John A. McSparran, campaigned against each other for the governorship, one on the Republican, the other on the Democratic, ticket.

The nineteenth amendment to the Constitution of the United States, granting suffrage to women, was ratified in 1920. A large share of the credit for this forward step should go to the Grange, the founders of which had, when it was organized, more than half a century earlier, recognized the political equality of the sexes. This amendment was the culmination of seventy-five years of agitation for "women's rights." Most of the agricultural journals of 1850 to 1870 opened their pages to discussion of the movement, but few supported it. The editors "could not believe that any *intelligent, noble-minded* woman, true to her best interests and to the welfare of her family, would be willing to descend from the holy and sacred precincts of *Home* to sacrifice and degrade the finer sensibilities of the soul at the polls."

Pennsylvania farmers never have been aligned exclusively with any one of the major political parties. Between 1840 and 1854, practically all were either Whigs (National Republicans) or Democrats, the larger number being Democrats. By 1856, the anti-slavery Republican party of Abraham Lincoln had begun to find many adherents in rural Pennsylvania. In the election of 1858, the much-reviled "Black Republicans," most of whom were farmers and workers in industry, accomplished the defeat of all but three of the Democratic candidates for Congress against the powerful influence of the capitalists and merchants of Philadelphia, whose business interests were bound up with the economic life of the southern states and who proclaimed, "Without the South we are ruined." Republicans quickly became the dominant party of the State and held almost undisputed sway until 1934, when Democrats gained ascendancy temporarily. In general, rural Pennsylvania was predominantly Republican until 1932, after which it was more evenly divided between the two major parties.

Prior to 1880, politics was the chief preoccupation of men, religion, of women. Politics was prosecuted with intense personal bitterness. Fraudulent elections were not confined to cities. A. K. McClure records that in 1836 "One township in Huntingdon County returned 1,060 majority for Ritner in a district where there were not 200 citizens."[9]

Few Pennsylvania farmers have been diverted from their allegiance to one or the other major political parties by the "agrarian revolts" that have sprung up from time to time, mostly in the West; these have been too radical to attract many of the traditionally conservative tillers of the soil of this Commonwealth. The Greenback Party of 1876-1884, which was composed mostly of western farmers and laborers, made no headway in this State. The Farmers' Alliance, which was organized in 1875, spread rapidly through the West and South, but found few adherents among Pennsylvania farmers, even though its objective was "to combat the overpowering monopolies which seek to enslave a free people, and to dry the tears of widows and orphans." Neither were they responsive to the appeal of the Peoples' Party (Populist), organized in 1891 by discontented western farmers. The National Non-Partisan League, which originated in North Dakota in 1915 and effected a political revolution in that and a few other western states, invaded Pennsylvania in 1918, but farmers turned deaf ears to the harangues of its promoters. Its platform called for state-owned grain elevators, flour mills, meat-packing plants, fire and hail insurance companies, rural credits, and the exemption of farm improvements from taxation.

From time to time, attempts have been made to align farmers and organized labor in one political party, but without avail. The Farmer-Labor party of 1920 met a cool reception in Pennsylvania. In 1917, the State Grange appointed a committee to meet with one representing the organized labor of the State. The two groups adopted a "statement of principles" which declared: "The interests of workers in cities and on the farms, rightly understood, are substantially the same. . . . We recommend to the organizations, here represented, the establishment of a joint working alliance."[10] Nothing developed from this proposal, presumably because the economic and political interests of the two groups are not, in fact, "substantially the same.'"

The influence of farmers has been marshalled at the polls and elsewhere in support of many moral and economic issues. When the long arm of the southern slave trade reached into Pennsylvania to recover its human property under the Fugitive Slave Law of 1850, many usually law-abiding rural people accepted dangerous assignments in the loosely-organized "Underground Railroad" which enabled thousands of slaves to escape. The rural town of Columbia, on the Susquehanna, was an important center of these stealthy operations. Liquor saloons were voted out of most rural districts long before the sale of intoxicating beverages was regulated by the State. Rural people were active in attempts to unseat the corrupt metropolitan political machine which controlled the State from 1861 to 1934. For three-quarters of a century, the State Grange has battled for the fullest practicable measure of local self-government and against the extension of federal authority. In 1935, it reaffirmed the statement, in 1912, of Woodrow Wilson: "The history of liberty is a history of resistance. The history of liberty is a history of the limitation of governmental power, not the increase of it."[11]

FARMERS AND WAR

"The instinct of farmers," said Nicholas Biddle of Philadelphia in 1840, "is for peace—for the empire of reason, not of violence; for the rule of votes, not bayonets." Nevertheless, the great majority of Pennsylvania farmers have come to the support of their country in time of war. Only a small proportion, mostly Friends and German sectarians, are pacifists by religious conviction.

As in the Revolution, the moneyed interests of Philadelphia strove to avert the Civil War not only because many had pacifist leanings, but also because they viewed with dismay the disruption of their extensive trade with the southern states. The rank and file of Pennsylvania people, however, particularly farmers, were not willing to sacrifice a moral principle to economic expediency, and helped to send Abraham Lincoln to the White House. Most farm youth either volunteered for service in the Civil War or responded to the draft; few paid for exemption.

Rural sentiment for the prosecution of the Civil War, however, was by no means unanimous. Most of the dissenters were Quakers, Mennonites, Moravians, Brethren, Schwenkfelders, and other small groups of German sectarians. Their stand for non-resistance and against participation in war was based on such Biblical passages as "Love your enemies," "Resist not evil," and "Avenge not yourself." If drafted, these conscientious objectors were exempted on payment of $300. The overwhelming majority of German-speaking farmers, however, were Lutherans and Calvinists whose church tenets contain no injunction against participation in military service; they volunteered in large numbers. Most farmers of English and Scotch-Irish ancestry supported the war without reservation.

From 1914 until 1917, before the entrance of America into World War I, some Pennsylvania farmers of German lineage were inclined to be sympathetic to the cause of their fatherland, responding to the propaganda of the German-American League, which was mainly urban. When the United States was forced into the conflict, on April 6, 1917, after repeated provocation by the Central Powers, practically all farmers, regardless of ancestry, rallied strongly to the support of their government, but there were a few pacifists, anti-conscriptionists, and slackers.

In the early stages of the conflict, before adequate recruiting machinery had been set up, some conscientious objectors received rough treatment from military authorities and war-inflamed citizens; but soon all were exempted under the "agricultural clause" or served in a non-combat capacity, many in Conscientious Objectors' Camps in which their time was devoted to the production of food.

The patriotism of many farm youths was put to a severe test; they desired to enter the military service, but were told that their greater obligation was to stay at home and produce food. Never had there been a more general recognition of the primary importance of farmers in the national economy. In his appeal to the farmers at the outbreak of the war, President Woodrow Wilson said, "The supreme need of our own nation and of the nations with which we are co-operating is an abundance of supplies, and especially of food stuffs. . . . Upon the farmers . . . , in large measure, rests the fate of the war and the fate of the nations."[12] Pennsylvania farmers were called upon to "go over the top" in food production. The national Secretary of Agriculture told farmers, "You occupy the first line of trenches of the food army. You fight in the furrows." In May, 1918, Howard Heinz of Pittsburgh, Federal Food Administrator for Pennsylvania, stated: "England and France . . . will need every kernel of our wheat to keep off starvation until the coming harvest brings relief. The first and most patriotic duty of every Pennsylvania farmer should be to deliver all available wheat to market at once. . . . Hoarding farmers and Pro-German farmers are becoming more and more uncommon."[13]

In the opening months of the war, a few super-heated city patriots indicted farmers generally as slackers. Said one of them in 1917, "Farmers will neither buy Liberty Bonds, sell their products at a fair price, or fight. It is about time for the farmer to do his part in a war which is as much for his benefit as for those who are putting up the money and doing the fighting for him." Nothing could have been more unjust. Thousands of Pennsylvania farms were stripped of needed labor to meet the needs of the armed services; farmers, their wives, and young children worked sixteen hours a day (not the eight hours of organized labor); and they bought more Liberty Bonds in proportion to their incomes than any other group of citizens. The magnificent contribution of farmers in men, in food production, and in helping to finance the war is a matter of history.

Armistice Day, November 11, 1918, was a time of great rejoicing. The war to end wars had succeeded, it was believed, and the world was made safe for democracy. Disillusion came quickly. Most farmers supported the proposed League of Nations, hoping that this agency might become an instrument for the promotion of world peace. This hope was dashed.

By 1940, another world conflict had begun. The totalitarian governments in Europe threatened to engulf the democracies. In 1939, President Franklin D. Roosevelt assured the nation that America will remain neutral, but it was not to be. In 1940 he called for a two-ocean navy, 50,000 planes, and peace-time conscription. On October 16, 1940, more than 16,000,000 young men registered for selective service, and National Guard divisions went into intensive training. Agricultural Defense Committees were organized in practically every county to gather information on farm labor and equipment "that may be needed in the event of a national emergency." America was poised for participation in World War II. This set in motion forces, policies, and programs that were destined to have a profound effect on agriculture.

At the close of this period, in 1940, the nation was on the threshold of a new and perilous era. The public had read with curiosity accounts of laboratory experiments in America and Europe on smashing the atom, splitting the nucleus of uranium, and other nuclear fission research. Only a few scientists comprehended, vaguely, the possible import of these discoveries. The "Atomic Age," with its tremendous potential power for good or evil, was at hand. The part that farmers might play in the peaceful utilization of this force was unknown. A few recalled the prophetic words of Nicholas Biddle in addressing the Philadelphia Society for Promoting Agriculture, in 1822: "The American farmer is the exclusive, absolute, uncontrolled proprietor of the soil that he tills. His tenure is not from the government—the government derives its powers from him. There is above him nothing but God and the laws he helped to frame. It may not be foretold to what dangers this country is destined but, whatever they may be, our most steadfast security will be the men of the soil."

NOTES

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